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Human Intestinal Parasitic Infections and Environmental Health Factors in Rural Egyptian Communities. A Report of the U.S.-Egyptian River Nile and Lake Nasser Research Project

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Ann Arbor

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The findings indicated a very low prevalence for all helminthic infections. A low prevalence of Ancylostoma and the Ascaris infections was found.

Important features such as the household stable, the zir (a water storage container), and cooking fuel were evaluated. Considerable information on water and wastewater use was developed. Also, a review of the available information on the parasitic infections of interest and environmental health conditions for rural Egypt was compiled for the first time.

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HUMAN INTESTINAL PARASITIC INFECTIONS AND ENVIRONMENTAL HEALTH FACTORS IN RURAL EGYPTIAN COMMUNITIES

A Report of the U.S.-Egyptian River Nile and Lake Nasser Research Project

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FOREWORD

After centuries of annual flooding and drought, the construction of the Aswan High Dam has provided effective flow control to the River Nile as it enters the fertile Egyptian Nile Valley. The dam has resulted in the production of hydroelectric power for municipal, agricultural, and industrial use, and the continuous availability of water has increased agricultural productivity. Optimum benefits from a project of this magnitude cannot be fully realized, however, until the major environmental, agricultural, social, economic, and public health impacts have been incorporated into strategies for managing the water resources within the basin. In 1975, the U.S. Environmental Protection Agency and the Ford Foundation began support of a 5-year, multifaceted research program conducted by the Egyptian Academy of Scientific Research and Technology and related institutions and the University of Michigan to provide the information needed for comprehensive water quality management in the Nile Valley.

Although the project addresses issues of vital importance to Egypt, the knowledge gained also will be of significant benefit to the general scientific community. For example, water resources management models developed for the Nile Basin can be applied to some river basins in the United States.

This report, a companion document to Schistosomiasis in Rural Egypt (EPA-600/1-78-070), describes a survey of common intestinal parasites in the Nile Delta, Upper Middle Egypt, and Upper Egypt that was part of the public health portion of the U.S.-Egyptian project.

David W. Duttweiler
Director
Environmental Research Laboratory
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PREFACE

The Aswan High Dam was built for the purpose of water storage, river flow control and hydroelectric power production. The fulfillment of these goals is of vital importance to Egypt's agricultural and industrial development programs. This can be easily realized since the River Nile constitutes 90% of Egypt's fresh water resources and the present population of 38 million people inhabits approximately 4% of the land with the rest barren desert. Nevertheless, since its inception, the Aswan High Dam has been under unprecedented attacks in the news media and scientific literature. It has been blamed for causing serious ecological perturbation that resulted in reducing the fish population in the Mediterrean Sea, lowering the fertility of the Nile Valley, and markedly increasing schistosomiasis in Egypt. Our study, Schistosomiasis in Rural Egypt, however,indicated a marked decline in the disease prevalence over the past 40 years.

These research findings are the outcome of a comprehensive ongoing project dedicated to the study of the River Nile and the impacts of the Aswan High Dam on multipurpose river uses. This includes irrigation, community water supply, fishing, recreation, transportation, etc. The aim of this project is to provide the decision makers in Egypt with river management alternatives compatible with government goals for economic development. This includes the assessment of trade-offs and predictions of the outcome of each river resource management alternative. This is a joint project between the Egyptian Academy of Scientific Research and Technology and the University of Michigan. The technical and financial support of the U.S. Environmental Protection Agency, the Ford Foundation, and the World Bank is highly appreciated.

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ABSTRACT

A survey of common intestinal parasites was completed in three areas of the Egyptian Nile Valley: The Nile Delta, Upper Middle Egypt and Upper Egypt. The relocated Nubian population was also included. The total sampling included 15,664 persons in 41 villages. More than 95% attended and approximately 90% provided a stool specimen. Environmental health observations and measures were made in each of the households from which a family was selected and in the village environs. Sampling within a study site (which included one or more villages) was designed in a fashion to provide a probability of selection. Stool specimens were preserved and examined for parasites and ova at a central laboratory using the MIFC technique.

The findings indicated a very low prevalence for all helminthic infections. A low prevalence of Ancylostoma and the Ascaris infections was found.

Important features such as the household stable, the zir (a water storage container), and cooking fuel were evaluated. Considerable information on water and wastewater use was developed. Also, a review of the available information on the parasitic infections of interest and environmental health conditions for rural Egypt was compiled for the first time. This information is necessary for the design of accurate parasitic surveillance programs.

This study is the result of a joint effort by the University of Michigan and the Egyptian Academy of Scientific Research and Technology that was funded by the U.S. Environmental Protection Agency, The Ford Foundation, and the World Bank.

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This work required the examination of almost 15,500 stool specimens which had been preserved in small 10 cc plastic bottles and shipped to the parasitology laboratory at the High Institute of Public Health from the various study sites. The laboratory was directed by Associate Professor Rashida Barakat, M.D. and supervised by Lecturer Ebtesam Omar, M.D. In addition, there were seven employees, all doctors of medicine who, as an extension of their training in parasitology, helped in the examination of these specimens. To them we are deeply indebted.

CHAPTER I

INTRODUCTION

BACKGROUND

This report is the second and final part of an analysis of data collected in rural Egypt on parasitic infections and key environmental variables. The study objectives, study design and methodology have been described in detail in the first part entitled Schistosomiasis in Rural Egypt: A Report of U.S.-Egyptian River Nile and Lake Nasser Research Project (Miller et al., 1978). Salient features of the study design and methodology are included in this report for purposes of clarity.

The objectives of this study were to obtain information on the prevalence of helminth and protozoan infections in selected rural Egyptian communities in collaboration with the River Nile-Lake Nasser Study, a joint University of Michigan-Egyptian Academy of Scientific Research and Technology project. The River Nile-Lake Nasser Project's prime objectives have been to evaluate the overall environmental impact of the Aswan High Dam (AHD).

Diverse disciplines have been incorporated into this project in an attempt to obtain an integrated picture of changes occuring in the Egyptian Nile basin, following the formation of the large man-made lake, Lake Nasser. It was in this vein that the design of the study reported here was formulated.

The parasites screened for are typical helminth and protozoan infections of the intestinal tract, common to tropical and semi-tropical areas of the world and detected by the identification of the characteristic ova, cysts or tropozoites in stool specimens. Frequently these infections are associated with water supply and use, as well as waste water disposal practices. It was felt that basic fundamental knowledge of the current prevalence, distribution and secular trends were important to determine the magnitude of the water management schemes now under development as a result of the formation of Lake Nasser. Furthermore, the implication of changes in prevalence or transmission of these parasites, directly or indirectly, as a related function of the lake formation was explored in an attempt to more completely follow the impact of the High Dam construction in the health of the rural Egyptian population.

Table 1 is a list of these parasites and a brief description of their principal mode of transmission. Some of these parasites have no direct relation with water supply, but were included as the methods of examination used to reveal these infections.

TABLE 1

HELMINTHIC AND PROTOZOAN PARASITES SCREENED FOR IN THE SELECTED RURAL EGYPTIAN POPULATION

Pathogen		
Helminth		
Ascaris lumbricoides	roundworm	man/pig-soil-man
Trichuris trichuris	whipworm	man-soil-man
Enterobius vermicularis	pinworm	man-man
Ancylostoma duodenale	hookworm	man-soil-man
Strongyloides stercoralis	threadworm	man-soil-man
*Taenia spp**	tapeworms	man-cattle/pig-man
Trichostrongylus spp		man-soil-man
Hymenolepis nana	dwarf tapeworm	man/rodent-man
Heterophyes heterophyes		man-snail-fish-man
Fasciola hepatica	liver fluke	man/sheep-snail-man
Fasciola gigantica	liver fluke	man/sheep-snail-man
Protozoans		
Giardia lamblia	intestinal flagellate	man-man
Entamoeba histolylica	intestinal amoeba	man-man
Entamoeba coli	intestinal amoeba	man-man
Entamoeba hartmanni	intestinal amoeba	man-man
Iodamoeba butschlii	intestinal amoeba	man-man
Chilomastix mesnili	intestinal flagellate	man-man
Trichomonas hominis	genital flagellate	man-man
Dientamoeba fragilis	intestinal amoeba	man-man
Endolimax nana	intestinal amoeba	man-man

* The ova of this genus are not morphologically differentiable.

Specifically, the objectives of this study were to:

1. Obtain and critically review all available past information of the prevalence, distribution, incidence and transmission of the selected parasites in an effort to establish baseline and trend data for the rural Egyptian population.
2. Obtain measures and estimates of the point prevalence of the selected parasites in rural Egyptian communities.
3. Show the changes in the epidemiology of the selected parasites through comparisons with assessed historical data.
4. In general, collect, assess and analyze environmental health data in parallel with the parasite surveys in the rural study sites.
5. Illustrate any village environmental effects on the transmission of the selected parasites studied.
6. Suggest appropriate needs in light of the findings.

THE SETTING: EGYPT

This study included 41 rural villages in 4 major and separate study areas in rural Egypt. In order that the reader have a clear picture of the study areas, and an understanding of the rationale in selecting these sites, the following notes have been prepared.

Egypt is made up of several distinct sectors. The largest sector is made up of the eastern and western deserts which account for over 90% of the land mass. The area is populated rather sparsely by nomads, with few small settlements. Located in the western desert are several more populated oases. El Kharga and El Dakhla oases, in what is referred to as the new valley, are sites of recent agricultural development and currently have a combined population of about 76,000 persons. There are also populated settlements along the western Mediterranean shoreline and along the Suez Canal. The remaining 99% of the Egyptian population is compressed in the Nile Valley and in the Nile Delta, 3.5% of the country's land mass. The population density in these areas has been estimated at 2,400 persons per square mile (Waterbury, 1971). For the purposes of this study, the Nile Valley has been divided into:

(a) the delta or lower Egypt,
(b) Upper-Middle Egypt, between the delta and Assyut, and
(c) southern or Upper Egypt located between Assyut and the Aswan High Dam (AHD). Before the AHD was constructed, there existed a people called Nubians located between Aswan and the Sudanese border. When the new lake inundated this area, the Nubians were resettled, en masse, in Kom Ombo, an agricultural plain about 75 km north of Aswan, and in Kheshm El Girba, in the Sudan.

The population of Egypt has always been predominatly "rural;" described by Scott (1937) as persons "whose habits of life bring them into contact with fields and canals where infestations with parasites may be acquired." In 1937, 11.49 million persons were living in a rural setting; 72% of the total population of 15.92 million. By 1960, 62% were rural. The rural population has further declined to 56.1%, according to the last census survey conducted in 1976 (Capmas, 1976).

The distribution of the Egyptian population is as follows: 60% of the population resides in Cairo or north of Cairo in the Nile Delta or Lower Egypt, 23% live in Upper-Middle Egypt, and 12% live in Upper Egypt (Omran, 1973). Males compromise 53% of the total population (Capmas, 1976).

CHAPTER II

CONCLUSIONS AND RECOMMENDATIONS

The key results of this investigation were; 1) that the parasite infections *Ascaris* and *Ancylostoma* are not elevated to high levels of prevalence at any of the village studies sites, 2) the high prevalence of *Entameoba* infections were present at all study sites, 3) the Nubians have not been adversely affected by their relocation in respect to the parasites studied or environmental health conditions which were greatly improved and 4) the most extensive descriptive data on environmental health conditions for rural Egyptian villages has been collected and assessed.

Conversations with officials from the Ministry of Health (the Secretary General of parasitic diseases) in 1975 before the field activities indicated that hookworm infections were low throughout Egypt, but that *Ascaris* was quite common in both the urban and rural sectors. The surprising findings of very low number of persons infected with *Ascaris* in the sample remains, in part, unresolved.

It had been indicated that piperazine had been widely distributed by the rural health units and centers in the period just previous to the field collection of specimens. This, in part, may have caused a sharp reduction in prevalence. Also, in Upper Egypt and in Nubia the prevaling opinion of the local practitioner was that both *Ascaris* and *Ancylostoma* were infrequent infections. Zawahry's findings in 1964 in Old Nubia are in agreement with these attitudes, and the results from New Nubia and Aswan are also consistent. It is with considerable reserve, however, that a figure of 8.4% is presented as a reasonable estimate of *Ascaris* infection in the Nile Delta. A more specialized small scale study aimed at establishing current rural health programs in the control of *Ascaris* transmission and concurrent prevalence surveillance is recommended. The primary design of such a study should be directed at obtaining the minimum amount of evidence necessary to determine the order of magnitude of *Ascaris* infestation in the population.

Based on the assumption that intestinal protozoan infections which have a fecal-oral route are an indicator of hygienic conditions, the high prevalence of the *Entameoba* infections indicates a strong need in this area. It is encouraging that *E. histolytic* was not found as frequently as did Weir et. al. (1952). Rather, *E. coli* infections were the most frequently identified *Entameoba*, at about 10 to 1 ratio. *E. coli* is not considered a pathogen and specific measures for control are not recommended. It is expected that an increase in water availability and water use would improve the hygienic conditions of the rural Egyptian villager and would result in an improvement in his/her well being. Indeed, it is water, specifically the supply of clean, cheap, ready available water that is wholeheartily recommended. Furthermore, any system that would increase the quantity, quality and use of water by the villagers should be considered. Appropriate technology rather than imported technology should be stimulated to meet these needs. In respect to water use and appropriate technological developments the household water container, the zir, must be taken into consideration. As revealed in the descriptive environmental health data, the zir, the stable and the fuel materials used for cooking are high priorities for improvement of the immediate environment of the Egyptian villager. Historical information indicated that the progress for installing latrines have been fairly well accepted and that standpipes or latrines are not a novelty in rural Egypt. This is encouraging, although there still remains a strong need for waste disposal in the sample from Upper-Middle Egypt.

The Nubians, in terms of parasitosis, were not found to vary greatly from their fellow Saidis (Upper Egyptians). This is a positive finding in that following the relocation of the Nubian tribes, it was expected that there would be a fall in their health status as measured by these studies. The same recommendations applied, therefore, to the Nubians in that improved water and hygiene measures are needed.

CHAPTER III

REVIEW OF LITERATURE

PARASITES STUDIED

There is no previous review of surveys available on the prevalence, distribution and transmission of these parasites in the Egyptian population. It is understandable that if historical information can be found, it must be assessed before a parasitic survey can be planned effectively. The search for historical data paralleled the assessment of the literature for schistosomiasis that has been published in the first part (Miller, et al., 1978). Like the information found for schistosomiasis, more historical data was uncovered than had been expected, although there are obvious restrictions on the interpretation of this past data. Important and fundamental aspects of the prevalence and distribution of these parasites were locatable. The principle reasons for restricting the direct comparison of these different studies are: the differences used in detecting the various parasitic infections in the excreta, and in the methods used to sample the human population from which specimens were obtained. Standardization in detection of parasites and ova in the stool remains to be established and is a recurrent source of ciiticism. However, sampling methodologies have clearly established that sample selection, based on probability is necessary before statistical measures, whether descriptive or analytical, can be applied. The latter aspect was frequently ignored altogether, where as detection methods were invariably elaborated on. In Table 2, a summary of the studies, found in the search for historical data, is given by area, date, author and parasite. Filariasis and leishmaniasis were not screened for in this project, but were included in Table 2, not only for completeness but also because of their potential severe impact on the health status of rural populations in less developed areas. Both studies by Shawarby, et al. (1965) and Cahill, et al. (1966) had wide coverage and impressive sample sizes. The reader is referred to these studies and the others cited in Table 2 for details on prevalence and distribution that are not shown in the table.

In parallel with the historical findings on human schistosome data, more surveys were completed in the Nile Delta than in the other sectors of the country. Also, the Nile Delta had consistently higher prevalences, regardless of the parasite or year, when compared to any other area of the country. This was also true for the schistosomes. It is unfortunate that the greater proportion of the rural Egyptian population (59.4%) is located in this same area.

Filariasis and leishmaniasis show very distinctive focal distributions in the Nile Delta. Both studies are now over a decade old, having been

TABLE 2

SUMMARY OF PREVALENCE SURVEYS FOR SELECTED PARASITES IN EGYPT

Area	Date	Author	Parasite Prevalence Ascaris	Hymenolepis	Ancylostoma	Entoameoba	Filariasis	Leishmaniasis
General	1965	Shawarby, et al.	-*	-	-	-	0.1	-
General	1966	Cahill, et al.	-	-	-	-	-	0.1
DELTA								
Kafr El Sheikh	1937a,b	Scott	28.0	-	30.0	-	-	-
Qalyubiya	1952	Weir, et al.	62.0	-	4.0	97.0	-	-
Qalyubiya	1954	Chaudler	50.0	-	8.3	59.0	-	-
Qalyubiya	1954	Chaudler	76.0	-	36.0	58.0	-	-
Rosetta	1966	Cahill, et al.	-	-	-	-	-	4.1
Damanhur	1966	Cahill, et al.	-	-	-	-	-	1.6
Hihy	1966	Cahill, et al.	-	-	-	-	-	20.7
Benha	1966	Cahill, et al.	-	-	-	-	-	7.3
Behira	1966	Farooq, et al.	66.0	1.7	4.3	-	-	-
Sharqiya	1965	Shawarby, et al.	-	-	-	-	6.0	-
Qalyubiya	1965	Shawarby, et al.	-	-	-	-	7.2	-
Minufiya	1965	Shawarby, et al.	-	-	-	-	0.08	-
Gharbiya	1965	Shawarby, et al.	-	-	-	-	0.0	-
Daqahliya	1965	Shawarby, et al.	-	-	-	-	3.0	-
Cairo	1966	Cahill, et al.	-	-	-	-	-	1.1
Cairo	1958	Rifaat	12.0	6.5	7.0	17.0	-	-
UPPER MIDDLE EGYPT								
Beni Suef	1937a,b	Scott	8.1	-	25.0	-	-	-
Giza	1962	Zawahry	54.0	8.6	10.0	41.0	-	-
Fayoum	1966	Cahill, et al.	-	-	-	-	-	0.0
Assyut	1966	Cahill, et al.	-	-	-	-	-	0.6
Beni Suef	1965	Shawarby, et al.	-	-	-	-	0.0	-
UPPER EGYPT								
Aswan	1937a,b	Scott	6.5	-	23.1	-	-	-
Old Nubia	1958	Rifaat	0.0	-	0.0	1.0	-	-
Old Nubia	1964	Zawahry	6.6	7.7	0.0	34.3	-	-
Sohag	1966	Cahill, et al.	-	-	-	-	-	1.6
Sohag	1965	Shawarby, et al.	-	-	-	-	0.0	-
Aswan	1965	Shawarby, et al.	-	-	-	-	0.0	-

*Indicates that the respective parasite was not searched for in the study.

completed in the 1960's. Hopefully, surveillance will be continued on these two important parasitic infections in order to determine if there have been more recent changes in prevalence or distribution.

Overall, it would appear that hookworm (Ancylostoma) infections are not as prevalent as the roundworm (Ascaris) infections. Chandler's studies on hookworm in 1954 found considerable variation (8.3% and 36.0%) in different village sites in the governorate of Qalyubya. This variation was determined by a single investigator and his respective research team, thus variation due to methodological differences were most likely minimal, thus indicating a strong focal distribution for hookworm infections. The differences in prevalence found between the other investigations support this hypothesis. However, the only historical data on a country-wide basis for hookworm and roundworm were made by Scott in the 1930's (Scott, 1937a and Scott 1937b). The expectation has, and still is, that hookworm would be consistently high, 90% to 100%, in the rural population of Egypt, and Scott (1937c) attempted to explain why it was not. It is interesting that no cases of hookworm were seen by Rifaat (1958) or Zawahry (1964) in old Nubia. Furthermore, Scott (1937a) found roundworm infection lowest in the Aswan area.

ENVIRONMENTAL HEALTH CONDITIONS IN RURAL EGYPT

The following material on environmental health conditions in rural Egyptian populations also appears in a previous report (Miller, et al., 1978). Since analytical aspects are included in this report and employ this information, this portion of the text is reproduced here for reasons of convenience for the reader.

The historical information sought for environmental health conditions in Egypt included the following:

1) General village sanitation
2) Water supply wastewater practices
3) Wastewater practices
4) Housing conditions
5) Refuse or solid waste practices.

Detailed analytical information on these parameters is rather limited for Egypt as a whole. Several local studies are available, however, for the delta and for Old Nubia. Data from these studies have been provided in somewhat greater detail.

Amin and Zaghloul (1959) reviewed the administrative organization of the EMH environmental services, but provided little data. They did point out that by 1959, protected rural water supply had been provided to each village over 1,200 persons. Generally, water was pumped from an underground source to elevated tanks which supplied a limited number of public water standpipes (one or more taps fixed to a vertical concrete slab). This water supply project had been started in the 1940's and by 1960 fairly wide coverage was obtained. In 1975 all villages had at least one source of water. The goal of one standpipe per 300 persons was 90% to 95% completed by this time (Furnia, 1975). This is very impressive when compared with the water supplies available in the rural villages of other similar developing countries. Installation of latrines in the rural areas has been less successful (Furnia, 1975).

The major refuse problem in Egyptian villages is animal waste (Headlee, 1933; Weir, et al., 1952). Animal manure is still commonly used for composting and for cooking fuel. The compost heaps and the drying dung cakes cause a serious sanitation problem by providing ample sites for fly breeding. For the most part, solid waste in the conventional western sense does not exist in Egyptian rural villages. Only infrequent isolated litter piles may noted in typical villages. However, where multistoried housing projects have been constructed and in urban areas there are extensive solid waste problems. On the village level very little solid non-organic material is discarded. This picture is now beginning to slowly change as the population grows and as more consumer goods become available to the rural populations.

Focusing on the delta, Headlee (1933) made detailed environmental observations on the rural village of Rushdy, Qalyubia. No clinical data were provided but excellent maps were made showing the defecation sites in the village. Samples were taken from these sites and examined for helminthic parasites. Enterobius, Ascaris, Trichuris, Hymenolepis and Ancylostoma were detected in the samples.

According to Scott (1937), this indiscriminate habit has important implications concerning hookworm transmission. If the same defecation sites were frequented, then hookworm transmission would be favored. However, defecation sites were scattered and, as Scott (1937) showed, the prevalence of hookworm was not as high as might be expected.

Headlee (1933) also observed the still common practice of disposing household wastewater in the village streets and that the presence of a stable attached to the home contributed to the intense fly problem Farooq, et al. (1966a) commented that village conditions in the delta had changed little since Headlee's report.

Weir, et al.'s (1952) study (1952) of the same general area (Sindbis, Qalyubia) confirmed Headlee's observations. Weir, et al. (1952) also found that 31% of all the homes in the study area had latrines, out of a total of 4,878 houses examined, and 10% had wells. Flies in the study site were noted in large numbers. Counts were made monthly on the fly populations. These counts showed seasonal fluctuations with low numbers in the middle winter months and high counts for the remainder of the year. Measures were taken to reduce the fly populations, and it is interesting to note that during a two year period in the areas where control was maintained, infant mortality was markedly reduced. This is a very important observation. No other environmental measure tested during this study demonstrated any improvement in infant mortality, indicating the overwhelming importance of flies as vectors of serious infantile diseases.

In 1966, Farooq, et al. (1966a), found that 87.6% of the people in Beheria, in the northwestern delta, had piped water, a 77% increase in the number with piped water since 1952. The exact distribution of people with or without piped water is shown in Table 3. Ten and one half percent of the sample used canal water exclusively.

TABLE 3

DISTRIBUTION OF EXAMINED POPULATION BY SOURCE OF WATER SUPPLY
AFTER FAROOQ, et al. (1966)

Water Supply	Number of People	Percentage Distribution
Canal	1248	10.5
Piped Water	10466	87.6
Other	70	0.6
Not Stated	160	1.3
TOTAL	11944	100.0

Table 4, reproduced from Farooq's study, shows the number and distribution of people by type of house. There were considerable differences between divisions with an overall 58.5% living in stone or redbrick houses and 40.3% living in mud or mud brick houses. Farooq, et al. (1966) also determined the number of persons with a cowshed and the number and distribution of latrines. They found that just over half of the population do not have cowsheds, 32.9% have adjoining cowsheds and 14.4% have separated cowsheds. The latter group was considered to be in a higher economic class than the former two. At these study sites, 52% of the population was found to have latrines; 10% had latrines and did not use them (It would be interesting to know just how this was determined.); and 36.4% did not have a latrine. This indicates that there is an increase in the number of latrines in the homes since Weir, et al.'s (1952) time.

As shown in the prevous sections on schistosomiasis, all the above environmental parameters influenced the transmission of infection, with the exception of latrines which showed a marginal decrease in prevalence, and only when age and type of house were controlled for.

In Upper-Middle Egypt only the report by Hassouma (1975) is available on a rural housing survey. Table 5 is reproduced from this report to the Egyptian Ministry of Planning. A majority of the houses obtained water from public standpipes (54%). However, a significant number (14%) had water piped to the home. For 12% of the homes, water came from the canals.

Hassouma (1975) also found that 6.4% of the houses were converted to sewage systems and that 10% had septic tanks. These fascinating observations, especially the presence of the sewage systems, beg the question "What did the author use as a definition or 'rural'?" Unfortunately, no answer was provided. However, over half of the houses surveyed did not have a latrine.

TABLE 4

DISTRIBUTION OF EXAMINED POPULATION BY TYPE OF HOUSING

AFTER FAROOQ, et al. (1966a)

Type of House	Number of People	Percentage Distribution
Stone or Red Brick	6988	58.5
Mud Brick or Mud	4811	40.3
Other	7	0.0
Not Stated	138	1.5
TOTAL	11944	100.0

Upper Egypt

In the area between Assyut and Aswan, only sketchy information exists and most of what does is centered on the Aswan environment only. In 1965, Aswan City had no sewage system and the large fertilizer plant (The Kima Company) nearby was inadequately treating its waste-water which was being discharged into the Nile (Messina, 1970). Other (Eachmann, 1965; Satti, 1970) reporting to the WHO found the Aswan urban area poorly developed in respect to waste-water management.

Old Nubia

In 1960, Abdady and Shalash (1966) from the National Research Center, Cairo, completed a one-year survey on the Nubians which examined the environment and livestock resources. Selection of families was based on the family register at each village and selections were representative and proportional to the 1960 census. It was a well-designed study. Each tribe was represented and Table 6 shows the number of families selected, by tribe, village and the location of the village on the eastern or western bank of the Nile. Table 7 shows the housing conditions for each area. Table 8 shows the type of water supply, lighting and food storage in the house. Whereas this table points out that no sewage system existed, the general description of the text stated that toilets were located inside the houses in the Fadiga area, and outside for the other two tribes. No numbers were provided on how many were available. Also included in this discussion was that the hand pumpwells located in the Fadiga area usually did not function.

TABLE 5

WATER AND WASTE-WATER FACILITIES IN UPPER-MIDDLE EGYPT

AFTER HASSOUMA (1975)

	Water Supply					
	VILLAGE					
TYPE OF FACILITY	Faraskour		Queaa		Deshna	
	No.	%	No.	%	No.	%
Piped Inside	36	13.6	4	1.6	48	35.8
Piped Outside	106	40.2	194	74.6	54	40.3
Hand Pump Inside	120	45.4	8	3.0	8	6.0
Canal	2	0.8	54	20.8	24	17.9
	Waste-Water Disposal					
Sewer	34	6.5	4	0.8	44	16.7
Septic Tank	94	1.8	8	1.6	38	14.5
Latrine	134	25.5	219	36.9	46	17.6
None	264	50.2	260	53.1	134	51.1

A description of the village areas was included in the report. In the Fadiga tribal areas, houses were in rows with 20-30 meters from one row to the next, spreading out over a 500 by 600 meter area. Houses made of combinations of mud, rock and cane were architecturally similar to the American Indian hogan with walls extending out to encompass a courtyard, a guest room and a stable. A characteristic feature of Nubian houses is the decoration of the walls, both on the inside and outside. There is a prevailing attitude throughout Egypt that the Nubians are exceptionally tidy and honest.

Floor plans of the old Nubian houses have been prepared by Fernea (1973).

In brief, Egypt has had a progressive plan for the provision of a protected water supply to the rural areas since the 1940's. A visit to the rural areas readily confirms the widespread distribution of rural water supply. This project's findings indicate fewer persons visiting canlas or unprotected water courses for their water, but still evident in the rural areas are the women washing clothes and dishes in the canals, the children bathing in the canals and the farmer irrigating his fields by ancient methods requiring contact with canal water. Generally, the sanitation conditions in the villages of Egypt have improved somewhat since Headlee's study (1933). In terms of crowding, they may have become worse.

TABLE 6

TRIBE, LOCATION, VILLAGE AND NUMBER OF FAMILIES
SELECTED IN NUBIA, 1960
AFTER ABDADY AND SHALASH (1966)

Tribe	Location on Nile Bank	Village	Number of Families Selected
Fadiga	West	Ballana	275
Fadiga	East	Abu Simbel	170
Arab	West	As-Sabu'a	75
Arab	East	As-Sangari	75
Kanoose	West	Sarf-Hussein	75
Kanoose	East	Kask Tamna	75

In the following villages, irrigation pumps and canals had been installed:

a) Dikka
b) Al-Alaqi
c) Aniba
d) Tushka
e) Aramna
f) Abu Simbel
g) Ballana

TABLE 7

HOUSING CHARACTERISTICS, OLD NUBIA, 1960

AFTER ABDADY AND SHALASH (1966)

TRIBE	House Characteristic							
	Area in m^2		Building Material				Number of Rooms	
	Total	Mean	Mud	Mud Rock	Wood Cane	Mud Cane	Total	Mean
Fadiga	234860	528	428	0	16	1	2658	5.9
Arab	53170	355	0	150	0	0	801	5.3
Kanoose	34550	230	0	150	0	0	627	4.8

TABLE 8

WATER SUPPLY AND LIGHTING IN OLD NUBIA, 1960

AFTER ABDADY AND SHALASH (1966)

TRIBE	Water Source			Lighting	
	Small Canals	Nile	Pump	Electric	Kerosene
Fadiga	94	275	76	0	445
Arab	0	93	57	0	150
Kanoose	0	10	140	0	150

CHAPTER IV

MATERIALS AND METHODS

This study is separated into two major subdivisions. The first, termed the "Downstream Study", is a comparison of environmental and epidemiological health parameters at different village sites comprised of indigenous rural populations located downstream from the AHD, excluding the relocated Nubians. The second, termed the "Nubian Study", is concerned with the Nubian populations displaced by the formation of Lake Nasser. The results of both investigations have been analyzed for correlations with environmental and epidemiological alterations resulting from the construction of the AHD.

DESCRIPTION OF THE "DOWNSTREAM STUDY"

The Downstream Study is designed to assess the impact of the formation of Lake Nasser on indigenous rural populations in Egypt downstream from the AHD. The design rationale is based on a comparative approach for which data are collected from more than one site. Thus it can be determined whether changes occurring over time or in a given location are unique, and casual relationships can be developed accordingly.

Three areas have been selected which afford maximum comparability. The first, from an area likely to be affected by Lake Nasser, are the rural villages north of the city of Aswan and south of Kom Ombo. The two other areas are Beni Suef, between the delta and Assyut, and Kafr El Sheikh, in the north central Nile Delta. For the sake of convenience, the three "areas" in which rural villages were selected for the downstream study are referred to as the Aswan, Beni Suef, or Kafr El Sheikh study area.

In each of these three governorates, rural villages have been selected based on: a) how representative the village is of the area; b) accessibility; c) population composition and size; and d) the presence or absence of a rural health center or unit. The selection of villages from these three areas was also based on information obtained from past studies. It was clear from these studies that Upper-Middle and Upper Egypt had frequently been excluded, with a far greater number of past surveys being carried out in the delta. Within the delta, more prevalence information on schistosomiasis was available for Qalyubia than all the other delta governorates combined. Sites in Kafr El Sheikh were selected, therefore, to help correct this deficiency of information. Also, historical data indicated that the northern delta, in which Kafr El Sheikh is located, had maintained the highest schistosome prevalence in rural Egypt. The data from Kafr El Sheikh provided the ultimate baseline prevalence for this study, as opposed to areas farther south and geographically more central. Villages were selected in the Beni Suef area as representative of Upper-Middle Egypt for the simple reason that recent data indicated that the distribution of _S. mansoni_ infections were slowly migrating south from the Nile Delta into this area (Hussein, 1972; Alamy and Cline, 1977). Sporadic cases of _S. mansoni_ had been seen in Beni Suef by Hussein (1972). It was therefore important to determine if _S. mansoni_ cases could still be found or were increasing.*

DESCRIPTION OF THE "NUBIAN STUDY"

This study is designed to measure the changes in the prevalence of parasites in the Nubian population following displacement due to the formation of Lake Nasser. The Egyptian Nubians, a population of 45,000 to 50,000 persons, resided in villages scattered along the banks of the Nile, south of Aswan to the Egyptian border. This population was displaced by the rising waters of the new lake in 1964. The Nubians, who were rural in nature and composed of three different tribes, were moved en masse to Kom Ombo, 40 kms downstream from the AHD. For all practical purposes, the entire population was resettled in this area. The new villages bear the same names as those from which the settlers originally came and, in addition, retain their respective locations as in old Nubia with the Kanoose tribe in the north, the Arab in the middle and the Fadiga in the south. No other formal arrangement was made by the government to have resettlements in other areas. However, there remains an original Nubian community located on the eastern Nile bank just north of the old Aswan dam, called Kazan Sharq. This is the southernmost village in Egypt with the exception of a very small village located on an island in the reservoir that inundates the area between the old and new dams. No resettlement sites are present on the lake shore. The high ground surrounding the lake is harsh, barren and, according to Dazo and Bile's (1971) survey, uninhabited with the exception of the Abu Simbel community 300 km upstream from the AHD. Although Abu Simbel does not constitute a rural/agricultural community, it is the only permanent lake shore site currently inhabited. In 1971, the population of Abu Simbel was 134 and was comprised mostly of government workers employed in the maintenance of the Abu Simbel temples. Abu Simbel does not represent displaced Nubian communities. Observations made during a 5 day trip on Lake Nasser in May, 1977 confirmed these findings. Earlier in the Review of Literature, Dazo and Biles (1972) found that 9% of the population there had _S. haematobium_ infections. No other helminthic infections were observed.

The Nubian study includes three major sites between which comparative studies have been made: a) the old, no longer existing Nubian villages of Kurta, El Malki, and Ballana; b) the correspondingly resettled sites at Kom Ombo; and c) the original Nubian community, Kazan Sharq, located on the eastern Nile bank just north of the old Aswan Dam.

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* (The determination of a change in the distribution of _S. mansoni_ infections to the south was an overriding consideration in respect to the selection of appropriate sites for the surveillance of the other helminthic and protozoan infections. In addition, there was no historical information that suggested that by selecting village sites in the Beni Suef area aspects of the distribution of these other parasites would be missed or overlooked.)

Abu Simbel had to be excluded because it does not represent the Nubian population. Also excluded are the lake shore sites which are yet to be developed, and the Lake Nasser fishermen. As mentioned previously, a joint WHO-EMH inter-region project (IR-065 RDF/71/217) is currently being organized to investigate the health status of the Lake Nasser fisherman population.

Definitions for pre- and post-AHD are needed to establish the point in time for describing "before" and "after" conditions necessary for making comparisons between studies. Pre-dam is defined as the period before the discharge of the Nile was controlled by the AHD. Post-dam is defined as the period from 1964 to the date of this study (1976). The construction of the AHD was not completed until 1974, but as mentioned earlier, the coffer dam, constructed to divert the flow of the river around the area where the AHD's foundations were being laid, was removed in 1964 and the ensuing floods have since been trapped behind the AHD. The reservoir reached maximum volume in 1976. The term "significant" is defined as a meaningful increase in the prevalence of a selected parasite when comparing the results from different study sites used in this research with results from other villages employed by other workers. Frequently, the number of cases may be large enough to demonstrate statistical significance between results differing only in one or two percentage points. Whereas this would constitute statistical significance, it would not be meaningful.

DATA ACQUISITION

The two major categories of data collected were: historical baseline data and data collected from field studies that included environmental health data and epidemiological morbidity data for the selected parasites mentioned. The implementation of the field survey was guided by a program evaluation review technique (PERT) diagram.

The PERT diagram identified and numbered each individual activity or job to be carried out. The time in days required to complete each job was estimated and then each job was placed appropriately in the sequence. Except for the first, each preceding job or jobs had to be completed before the following one could be started. Thus, projected dates of completion were calculated. Moreover, free slack, or the amount of time that a previous job could be postponed without delaying the overall projected completion time, was estimated. The estimated time to complete the field activities up to the point of analysis of the data was 265 days. The actual time for completion was approximately 260 days.

SPECIFIC DATA COLLECTED

The categories for data which were collected are:

1) environmental health parameters:
    a) water supply and use
    b) sewage disposal
    c) housing
    d) irrigation practices

2) epidemiological parameters:
   - a) age-sex structure of the sample population
   - b) parasite prevalence.

It may be noted that agricultural irrigation methods have been included as an environmental health parameter. Generally, irrigation schemes, as such, do not fall within the realm of environmental health specialties. However, in Egypt, as in a number of other tropical developing nations, agriculture practices and especially irrigation methods play a central role in the transmission of many parasitic diseases. Moreover, it is the open canals and drains which are associated with present day irrigation in Egypt that provide excellent habitats for snail vectors. For the rural populations of Egypt, canals long ago became a way of life. The convenience the canals have provided in the rural villages for domestic water for washing, bathing, swimming, drinking, and ablutions is readily evident to the visitor.

Data acquisition forms (questionnaires) were designed and translated into Arabic. These forms serve as a list for the various parameters under study. The original English data forms are included in Appendix 2, in part one (Miller, et al., 1978).

Considerable peripheral data are included in the survey listed on the data forms. As much data as possible were obtained concerning all the environmental parameters in the hope that nothing would be overlooked simply because it was not requested. Secondly, data were needed to control for certain variables; for example, age, sex, occupation, etc. Indeed, the study was originally designed under a much broader scope specified by the needs of the River Nile - Lake Nasser study of which this work was a part.

SELECTION OF FIELD SURVEY SITES

A total of ten health units and centers were selected in Kafr El Sheikh and in Beni Suef based on criteria mentioned in the description of the downstream study. The name of the health unit or center does not always correspond to the name of the village from which the sample population was selected. Sometimes more than one village was sampled by the health unit or center. This is true also for Aswan and for the Nubian sites.

In Kafr El Sheikh, the selected health units of centers, also termed "study sites", and their code numbers shown in parenthesis, were:

- a) health unit El Agazein (16): only the village El Agazein was sampled;
- b) health center El Hamra (17): only the village El Hamra was sampled;
- c) health unit Mahalet El Kasab (18): only the village Mahalet El Kasab was sampled;
- d) health unit Mahalet Mousa (19): Mahalet Mousa and El Nataf were sampled;
- e) health unit Sheno (20): two villages, Sheno and Reskit El Shenawi were sampled.

In Beni Suef, the selected health units or centers and their code numbers were:

a) health center Barout (11): only the village Barout was sampled;
b) health unit Sherif Pasha (12): only the village Sherif Pasha was sampled;
c) health unit Naiim (13): two villages, El Amrana and Abu Mousa, were sampled;
d) health center Beni Adi (14): only the village of Beni Adi was sampled;
e) health center Ashamant (15): only the village of Ashamant was sampled.

Both Kafr El Sheikh and Beni Suef are the respective capitals of their governorates. Kafr El Sheikh is about 2.5 hours' drive north of Cairo, roughly 140 km, and is located in the central northern sector of the delta. The northern border of the Kafr El Sheikh province is the Mediterranean Sea. Almost the same distance to the south of Cairo is Beni Suef. To the north of Beni Suef is Giza; to the west, the Fayoum; and to the south, Minya. Each of the villages selected in both Kafr El Sheikh and Beni Suef was an agricultural community typical of the area.

In Aswan the selected health units or centers and their code numbers shown in parenthesis were:

a) health unit Kazan Sharq (1): the village of Kakhor was sampled;
b) health unit Guzaria (2): the villages Gamma, Omrob and Harrob were sampled;
c) health center Abu Rish Bahri (3): the villages of Mal Katta and Mal Licta were sampled;
d) health unit Ga'afra (4): the villages of El Aratag, Shouna, Masagien, Falaleha, Omarab, Ali Abu Karime, El Sheikh Garat, Hedadoun, Hagar and Mahatta were all sampled;
e) health center Bimban (10) the villages of Kenisa, Abu Sharl, Omda, Mariab, Sheikh Mousa and Kabarra were all sampled.

In the Nubian resettlement area of Kom Ombo, the selected health units or centers and their code numbers were:

a) health center Ballana (5): the villages of Ballana 1,2, and 3 were sampled;
b) health unit Tushka (6): only the village Tushka was sampled;
c) health center El Malki (7): only the village of El Malki was sampled;
d) health unit Kurta (8): only the village Kurta 2 was sampled;
e) health center Kalabsha (9): the villages Kalabsha and Abu Khor were sampled.

The village of Kazan Sharq (1) is one of the most southern villages to be found in Egypt. This village is comprised of Nubians of the Kanoose tribe, and it should be pointed out that Kazan Sharq (1) and a few remaining villages just to the north, are also populated by Nubians who, because of their location downstream from the AHD, did not have to be moved when Lake Nasser began to fill. Rather, this small population of Nubians are living in the same villages and the same homes that they were living in before the AHD was built, or, for that matter, from the last century and before.

The villages located at health units and centers 2,3, and 4 are communities typical of the area between Aswan and the Kom Omba plain and are located on the eastern bank of the Nile. These communities are characteristically found in high, dry, barren ground. Because the Nile valley is so narrow in this area, very little land is available for cultivation, and, therefore, what is available is far too valuable to build on. The cultivated areas are always found as a green strip between the village and the river, with the exception of Hagar in Ga'afra, which is located on a low barren hill next to the river. In this respect, these villages are unlike the ones in the Kom Ombo agricultural plain. From the northern point of the Kom Ombo plain, continuing north, the narrow valley gradually begins to widen as it passes through the next two governorates, Qena and Sohag. In these sites the villagers live at a greater distance from the irrigation canals and drains than villagers located in the delta or in Upper-Middle Egypt. Villages are found within the cropped area with increasing frequency as one travels north and east of Aswan into Qena and into Sohag. North of Sohag only a small fraction of the rural population resides in villages located outside the cultivated land, and these villages are often bounded on one side by their fields. The health center Bimban (10), was selected to represent villages typically built within the cultivated area. Six different villages all located in Bimban markaz (center) were sampled. The Bimban markaz, seen on the map in Figure 11, is located on the western bank of the Nile valley, almost directly west of Daraw. The villages are separated from the Nile and from the desert to the west by fields of sugar cane and wheat, and by palm groves, etc.

The selection of the Nubian resettlement villages was based on the previous study by Zawahry (1964). Each village that was surveyed in 1964 has now been surveyed again for this study. They are Ballana (Fadiga) (5), El Malki (Arab) (7), and Kurta (Kanoose) (8). In addition, two other villages were selected: Tushka (Fadiga) (6) and Kalabsha (Kanoose) (9), to increase the overall sample size.

DATA COLLECTION TEAMS

The primary data collection teams at each of the selected health units or centers were comprised of a physician, a laboratory technician, a sanitarian, one or two nurses and one or more aides. The team was led by the physician whose responsibility was to implement the collection of data and to ensure that all activities were completed according to the outlined procedures (see Appendix 4). The cooperation and employment of the various health teams was obtained through the Egyptian Minister of Health and through the respective regional offices of the Director General of Health. The director-general provided transportation to the sites and local security approvals, and saw to it that the materials necessary to continue were received at the study sites. In addition, a field supervisor, typically a vice-director-general, was assigned to follow the day-to-day progress in the in the field and to work closely with the technical field supervisor (the writer). Aside from developing the plan of operation, acquiring materials, and training personnel, the role of the technical field supervisor was to coordinate the work at all levels at each of the twenty field sites.

The Egyptian Minister of Health assigned Dr. Baha Hashen, the director-general of all rural health services as a team representative from the ministry to the project. The EMH's services proved to be very helpful in establishing communications, transporting materials, collecting data, and obtaining cooperation of primary data collection teams.

The chief administrative team leader, Dr. M. Hussein, Dean of the High Institute of Public Health at the University of Alexandria, developed the administrative structure by which the various data teams and members were employed and paid, and closely followed the day-today developments in the field. In addition, Dr. Hussein obtained the necessary governorate approvals and security permits and provided the laboratory space and personnel for the analysis of the stool and urine specimens at the University of Alexandria.

REVIEW OF FACILITIES AND PREPARATION OF MATERIAL

The location for the examination of families was a rural health unit or a rural health center. Each health unit (for outpatients only) and each health center (small scale in-patient facilities available) selected was assessed for facilities needed for the survey. If facilities or equipment were lacking, they were obtained by the local field supervisor from the respective director-general's office. For the most part, these services were not needed as the health units and centers selected all had the required facilities and were in working order. These facilities included:

a) a light microscope, monocular model, with at least low power (16 mm focal length) and high power (4 mm focal length) objectives, and related equipment - slides, etc. Often these were manufactured in Czechoslovakia and were similar to Japanese Nikon models;

b) glass pipettes in sufficient quantity;

c) 250 cc glass conical flasks for urine sedimentation;

d) stool pans for the collection of stool specimens;

e) a hand centrifuge;

f) a balance for determination of weight and height.

The balances were made by Detecto Scales, Brooklyn, N.Y., U.S.A.; model Detecto-medic or similar. Microscopes, balances and hand centrifuges were placed in the health units and centers by UNICEF about 5 years previously in a program to update rural medical facilities in Egypt.

The additional materials needed by the health units or centers for the recording of data and preparation of specimens were:

(1) printed data forms in Arabic;

(2) solution for preservation of stool and urine specimens;

(3) 10 cc plastic specimen vials or bottles;

(4) disposable applicator sticks for transferring stool specimens;

(5) permanent felt-tipped ink pens to label specimen bottles;

(6) a reference or methods guide for the correct procedure to be followed during the survey.

Printed Data Forms

The data forms for the clinical examination of the family, form code 01; and the data form for the examination of the house, form code 02; were first translated into Arabic at the High Institute of Public Health. The same procedure was used for the environmental forms coded 03 through 12. (All data forms and the methods guide are included in Appendix 2 and Appendix 3, respectively, of part 1.) The translated forms were reproduced by mimeograph. At the beginning of the field activities, all forms were reproduced at the High Institute of Public Health. Over 8,000 forms of 01 and 02 were necessary. Form 01 had three pages and 02 had four. Therefore, 56,000 sheets of paper were required just for these two forms. It soon became obvious that delays would develop if the forms continued to be mimeographed at the High Institute. Paper, stencils, and staplers were purchased and delivered to the local director-generals' offices, which took over the responsibility of providing printed forms.

Data Form Design--

The data forms for the examination of the family were based in part on the studies by Farooq and Nielsen (1966), Zawahry (1963), and Hussein (1972). At each health unit, a guide for the correct completion of the data form from the examination of the family was provided. This guide also included the correct method by which all procedures were to be carried out for the collection of field data. The guide served only as a reference and was not a substitute for instruction.

It should be pointed out, however, that special procedures were taken to determine age. The determination of age in a highly illiterate population is prone to error. Measures to minimize errors were adapted from Scott (1937). Scott (1937) found that it was more accurate to place a person in an age-group than to estimate the person's exact age. An age group sheet of 5-year age groups (starting from 0-1) was distributed with the methods guide and instruction for use was given to the physician. Birth dates were recorded only when government identification cards could be provided.

An attempt was also made to determine what medication, if any, the individual had taken in the 360 day period prior to the day of examination. Only medications for parasitic diseases were recorded. Other medication received was recorded as "other." Details for the methods of obtaining the remaining data and data for the housing are described in the methods guide.

The design for the housing form, code number 02, was adapted from Mitwally and Sharqawi's (1970) article on measuring housing conditions in the rural areas of Egypt. For each data form a clear plastic overlay sheet with an English translation was made. These clear overlays provided an instant translation of the Arabic data form into English. As a guideline, the house to be examined by the sanitarian was defined as "the area lived in by the selected family."

PRESERVATION OF STOOL AND URINE SPECIMENS

It was clear from the beginning that there was considerable variation in ability to examine stool specimens for parasites and ova between laboratory technicians at the selected health units and centers. To compensate for the undesirable variability and to maximize the comparability from one study site to another, all stool specimens were preserved and sent to the laboratory at the High Institute. At the "central laboratory" the specimens were examined by a staff of trained personnel.

To implement this central approach for the examination of the specimens, a 10 ml translucent polyethylene bottle was provided for each individual at the selected sites. These bottles were purchased in Cairo and were 2 cm in diameter, 5 cm tall with a 1 cm opening in the top for which there was an inner cap and an outer screw cap, all polyethylene. On each bottle, the code number of the individual, comprised of the health unit number, the family code number, and the individual's number within the family, and his or her name was written with black, permanent, felt-tipped pens. Both pens and bottles performed well over the period of the survey. There was no occasion when the label came off, and the bottles, which were unbreakable, did not leak even though an occasional screw top had been deformed during the molding process.

The procedure for collecting the stool and urine for preservation is outlined in the methods guide. Two points should be added: 1) that the urine specimens were examined at the health units by the laboratory technicians. In addition, two drops of urine sediment were added to this stool specimen for preservation and examination later at the central laboratory. In this way a double check was provided on the examination of urine. The results of the on site examination were recorded on the data form for the examination of the family, form 01; 2) the transfer of the stool from the stool pan to the specimen bottle and the mixing of the stool with the preservative solution required something cheap and disposable. Broom straws, along with matchsticks and toothpicks, were all tested unsuccessfully. Very common in Egypt are small vegatable crates made by hand from palm fronds. The ribs of these crates were found to split nicely into straight wooden sticks which easily transferred and mixed the specimens. For preservation, the stool was mixed with 9.0 to 9.5 cc of merthiolate-formalin solution adapted from the merthiolate-iodine-formalin concentration technique (MIFC) (Blagg, et al., 1955). Ova, cysts and trophozoites in fresh stool specimens collected in the MIF solution have been successfully preserved without deterioration of descriptive cytological features for a number of years. The exact period before deterioration begins is under study at the Naval Americal Medical Research Unit (NAMRU-3) in Cairo where the technique was first developed. Instead of adding iodine (Lugol's iodine) at the time of preparation when the specimen was mixed, as prescribed by this technique, the Lugol's iodine was added afterwards at the central laboratory just before the ether extraction phase. This alteration in technique, in addition to the fact that approximately 0.05 ml of urine sediment was being added, did not interfere with the desired staining intensity. By delaying the addition of Lugol's iodine at the health unit or center, the amount of materials that had to be delivered was reduced. This also assured that the Lugol's solution used was fresh, as it begins to deteriorate as a stain after one week. Thus, the urine was examined twice, once at the health unit or center and once at the central laboratory.

EXAMINATION OF STOOL AND URINE SPECIMENS

All specimens were collected from each of the study sites and transported to the parasitology laboratory at the High Institute of Public Health. At the laboratory, a team comprised of nine physicians examined the specimens. The team was supervised by three senior lecturers of parasitology at the High Institute.

All specimens received at the laboratory from a particular health unit or center were grouped together. There was no intended order within the group and a few specimens at a time were selected for examination from each group. This quasi-random method helped minimize the biasing effect of individual ability among the laboratory personnel.

The preparation of a specimen for examination was as follows:

1) the specimen was mixed and poured through a layer of wet gauze into a labelled centrifuge tube;

2) 0.6 ml of fresh Lugol's iodine was added to the specimen;

3) 4 ml of petroleum ether added in order to increase the specific gravity of the ova and cyst by extracting the lipid fraction. The tube was inverted and shaken vigorously;

4) the specimen was centrifuged for 5 minutes at 1500 rpm;

5) the top ether layer and fecal plug, and MIF layer were removed by suction, leaving the sediment and about 0.1 ml of MIF solution on top of the sediment;

6) the sediment was resuspended and a drop of this mixture placed on a microscope slide, and covered with a cover slip;

7) the slide was examined for characteristic ova, cysts, and trophozoites;

8) results were entered on a coded specimen examination form, an example of which is shown below.

Stool Examination Form (Code 15)

Specimen vial number:

Date:

Helminths:

Ascaris lumbricoides	1
Trichuris trichiura	2
Enterobius vermicularis	3
Ancylostoma duodenale	4
Strongyloides stercoralis	5
Taenia sp.	6
Trichostrongylus sp.	7
H. nana	8
H. heterophyes	9
F. hepatica	10
F. gigantica	11
S. haematobium	12
S. mansoni	13

Protozoans:

Giardia lamblia	14
E. histolytica	15
E. coli	16
E. hartmanni	17
Iodamoeba butschlii	18
Endolimax nana	19
Chilomastix mesnili	20
Trichomonas hominis	21
Dientamoeba fragilis	22

Examined by:

The coded specimen form includes a place for the code numbers, date, form code and code number of the examiner at the laboratory who examined the slide and places for indicating the presence of the various parasites screened. Only one slide for each specimen was examined.

An in-laboratory test was used to obtain data on individual examiner error. One specimen each day was examined by all members and the results scored independently. It was requested that the personnel examine the "test" slide in the same fashion as all other slides. The exam results were not shown to the personnel, and it was emphasized that this was a procedure to estimate error rather than a proficiency examination. All laboratory personnel at the High Institute were closely followed and exhibited proficiency in the identification of the various parasites. The helminth ova are easy to identify as they are generally large and very characteristic in morphology. Proficiency was assured by comparing sample specimens with the NAMRU-3 laboratory.

SELECTION OF THE SAMPLE POPULATION

A systematic sample was taken at each study site. The unit of selection was the family. All members of each family in the sample were examined. From each study site about 200 families were selected systematically from a list drawn up from the village or villages to be sampled that included all the families of the village or villages and all the members of each family. By selecting 200 families per health unit or center, a sample total of approximately 700 to 900 persons was estimated. The target sample size for all study sites in both studies was between fourteen and eighteen thousand. The family list was the sampling frame. For purposes of selecting the sampling unit (the family), the family was defined as a man, his wife or wives, and all unmarried offspring. This definition was easy to use and fairly stable, i.e. the average number of persons per family did not vary greatly from site to site, though in Upper Egypt, the families were somewhat smaller. (Note that not all offspring of a selected married female may have been examined.) All selected family members were accounted for. If a member did not attend the examination, an explanation of why the member was not present was stated on the family examination form. No attempt was made to replace those who would not come, were absent at the time of the survey, or had died.

To make the selection of the families, an up-to-date list of family names and members, or sampling frame, was required. Generally, a frame was available but often out-of-date by four to five years. In order to avoid delaying the start of the survey, the following procedure was implemented. The total number of families in the old list was divided by 200. The number obtained, for example 3.4, was rounded off to the next higher number and added to one (two or three in other cases depending on an estimate of how many new families would be added). In this example, with a starting list of 680, every fifth family would be selected starting from a random number between 1 and 5. The frame would immediately begin to be updated, adding new families at the end of the list, and the examination of the selected families starting from the first selected and proceeding sequentially was also begun. The up-dating was always finished long before the examination of the first selection of families could be completed. The selection of every fifth family according to this example would result in an under-selection, i.e. less than 200 would be selected. In this case, about 136 families would be selected if 120 new families were added to the original list of 680. After the examination of 136 families, 64 families would have to be reselected from 664 remaining unselected families by selecting every tenth family. Reselection being made without replacement, a total of 202 families would be selected and examined. This approach was used throughout the study, with two or more samples (one or more reselections) from each site being taken in this fashion. Each selected family was circled and serially numbered in the list of family names and members.

The serial number for the family became the serial code number for that family. The members of the family were listed serially starting with the first person examined on the family examination data, form 01. This gave each individual that was examined in the survey a unique code number comprised of the number of the village, the family serial code number, and the individual code number within the family. The code number 01,001,01 identifies the first person in the first family selected at the health unit 01, Kazan Sharq. The health unit or center code number and the family serial code number were used to identify the data froms 01 and the housing data forms 02. The data form 02 was completed for each house of each of the selected families. These forms were matched with the family 01 forms by coding the 02 forms with the health unit or center number, the house number, and family serial code number. The same sample size (200 families) was used throughout the survey, rather than selecting a given proportion of the population at each site. Therefore, the sampling fraction varied from site to site. This was done for administrative reasons, and because it was desired that the completion of the survey of the familes and the environment be roughly during the same period of time at all sites. The reason for this was that by carrying out the survey at the different sites over the same period of time, the possibility of seasonal variation of the parameters measured between the sites would be negated.

It was estimated that 200 families would yield a sample of about 800 individuals. This sample size was felt sufficient to give the estimates of the various parameters sampled with adequate precision at each site. The systematic selection of families was used as opposed to a purely random method for two reasons: 1) the systematic selection more often than not gives greater precision. With a systematic selection, no isolated groups, individuals, or houses are left unrepresented in the sample, as might inadvertently happen with a random selection; 2) the selection of the families for examination could proceed immediately without waiting for an up-dated family list. A random sample would be impossible to select before the list was completed because the added group would not have a known possibility of being selected in the first round.

EXAMINATION OF THE ENVIRONMENT AND THE POPULATION

Before the survey could begin, each health unit or center had to receive the necessary materials and the personnel had to review the methods for the correct filling in of the data forms and the correct method for preparing the stool and urine specimens. The up-dating of the family list was always the first activity, followed by the selection of the families. In order to obtain the cooperation of the village members, a meeting was held with the village council, the local physician and the field supervisor, to explain the purpose of the survey and solicit the aid of the council to overcome any difficulties. On occasion, the director-general of the governorate attended these meetings. Only after the personnel at the health unit or center showed proficiency with the different aspects of the data acquisition, was the examination begun.

Generally, a routine was established where the sanitarian would go to the selected family's house, complete the housing form and instruct the family to go to the health unit or center the following day. The instructions included telling the family members that the information obtained would be held in strictest confidence and that specimens of stool and urine would be requested at the health unit or center. At the health unit or center, the selected family members would be given a numbered stool pan and a numbered tin cup and requested to provide a specimen of each at some point during the examination.

By obtaining the specimens from the selected family members at the health unit or center, proper identification of the specimens could be guaranteed. This is a unique feature to this survey. Scott (1937), Farooq and Nielsen (1966), and Zawahry (1963) all obtained their specimens by providing specimen containers to the heads of the household of each of the families selected.

There were exceptions, most notably at Kurta (8) in the resettled Nubian area. The water supply in the laboratory at Kurta (8) was the most inadequate of all the selected sites. The piped water supply was limited to a few hours a day and frequently failed for periods longer than 48 hours. Water rarely came to the health unit's laboratory. At Kurta (8), protected water was used first for drinking and cooking before it went for other purposes.

Because of this lack of water at the health unit, selected family members refused to give stool specimens. Under the circumstances, the methods of Scott (1937), Farooq (1966), and Zawahry (1964) were employed. Thus the correct specimen was obtained. Also, a large metal reservoir was given to the health unit laboratory so that water could be stored and available to clean equipment.

Trips to the field to initiate the survey activities were made in early April, 1976. By May, 1976 all units and centers had begun the collection of data. After the survey had begun, each field site was repeatedly visited. During these visits, additional materials were supplied, completed data forms and prepared specimens were picked up, and, if required, a reselection was made. This evaluation included the following:

1) a check to see if the names on the completed 01 and 02 forms corresponded to the names in the family list;

2) a check to see if the correct code numbers were being used;

3) a check to see if the code number on the specimen bottles corresponded to the code number on the family form 01;

4) a check to see that the housing forms 02 were being correctly completed. This was done by selecting several completed forms and going to the respective homes and seeing if the completed

forms agreed with the actual conditions;

5) a check to see if all the families in the village were included in the family list. This was done by going to the village and randomly selecting a house to see if the occupants were listed in the book. On no occasion was a family located that had not been included. It should be pointed out that 1) the sanitarians are well-trained in this respect; and 2) they were often residents of the village who knew the villagers well, and were actually related to many of them;

6) to review any problems or obstacles being met and to resolve them;

7) to review the general progress, and to determine if the health unit or center was on schedule. Since only part of the working day could be allotted to the examination of the family members or the environment at the health unit or center, it was requested that approximately 20 persons per day, or five to six families, be screened at a time. The examination of the families and their environment at each site, which was to be completed in about three months, was actually 95% complete after five months;

8) to review the method of examination of the selected family members. This was done by observing the completion of the family form 01, with the physician at the health unit or center during a visit when examinations were being carried out. First, a family that had been examined just prior to arrival was recalled and re-examined, while checking the completed form for discrepancies. Secondly, the completion of the family form was followed through on a family who had not been examined. This was especially helpful in detecting errors in obtaining and preparaing specimens. Idiosyncratic procedures were noted during this time. Those which did not in themselves affect the collection of data were usually allowed to continue, as changing procedure would risk causing errors;

9) confirmation of the methods used at the health unit or center for completion of the environmental data forms were reviewed in the same fashion as was employed for checking the housing forms;

10) on occasion, persons or families would come to the health unit or center requesting to be included in the examination. If the person was elderly and a relative of a selected family or a village leader who had not been selected, forms were completed and specimens taken. No code numbers apart from the health unit number were given to these individuals. Data from these forms were not included;

11) an inventory of all the materials;

12) one of the most important checks was to see if the specimens of stool and urine were correctly examined, prepared and labelled. From the very first it was stressed that the right stool and the right urine be placed in the right bottle in the corrent manner. (The correct procedure was outlined for the laboratory technicians

in Arabic.) This procedure was reviewed frequently at the health units and centers at the time when specimens were being provided by the selected individuals.

DATA MANAGEMENT AND ANALYSIS

For this study, 3,859 house data forms were executed for the examination of the dwelling units. An almost equal number were completed for the examination of the family. About 400 data forms were completed for the various environmental aspects of the village sites. Exactly 15,665 stool specimens were received. Ultimately, over 40,000 cards were keypunched.

When raw data in these quantities are obtained, major efforts have to be made to keep the data from being misplaced, lost, or damaged before it can be processed. This was aggravated by the distances involved between the 20 different study sites, as well as by the lack of good communication systems. Invariably, staff at the health units faced problems after actually starting the survey that were not anticipated during the training phase. Most often the problem was solved by a change in coding procedure which did not affect the final accuracy. For example, on the housing form (02), in an unanticipated situation, the correct answer required the selection of more than one number, although only a single answer had been anticipated, and only one box had been provided on the data form. The examiners simply wrote in two numbers, or whatever the combination may have been, in the given box. This alteration was easily handled when the coding sheet was designed. The process was not always as uncomplicated as this and new combinations necessitated redesigning the code sheets.

To minimize problems of data management, a complete inventory of the number and amount of materials delivered and received from each study site was kept. Before data forms were accepted, they had to be checked for completeness, consistency and accuracy.

All completed forms were packaged and delivered to the Cairo University Statistics Center. Code sheets were designed, tested, and redesigned. The final coding sheet for a particular form was reproduced at the center by offset printing.

Before transferring the data onto code forms, a code book or code key was developed for each type of data form. The questions on the family examination form 01 concerning diagnosis and medication received were the only examples of truly open questions, and required continued updating of the code book. The greater part of the coding was simply copying a selected number onto the code sheet.

Coded data were verified on a sample of forms from each site before punching. Punching formats were designed from the code sheets, i.e. data were punched directly from the code sheet. At the computer center printed listings of each site were made and checked against a sample of original data forms. For listing the data on magnetic tape, the punched cards were sorted by site, family and individual, and a file on magnetic tape was created for each category of data form.

A series of Fortran IV programs were written at the Cairo University Statistics Center for use on a Data General 'Nova' computer. These programs were for:

1) preparing listings of various sub-sets of data;
2) basic tabulations of important variables in the data set. A number of tabulations were used to follow the work in the central laboratory, and were designed specifically to detect errors and inconsistencies made by the laboratory workers;
3) sequencing, matching, and renumbering of specimen data;
4) validating and examining the consistency of coded data;
5) eliminating duplicates in the specimen data; and
6) writing the data set onto magnetic tape files.

The complete data set stored on magnetic tape was transferred to the University of Michigan's computing center for continued analysis. At the University of Michigan, the Michigan Terminal System (MTS) and the Michigan Interactive Data Analysis System (MIDAS) were used to:

1) re-edit various sub-sets of data based on the results of verification programs run in Egypt;
2) match and merge the data from the family examination with the data from the specimen forms and housing forms for the creation of a master data file; and
3) to complete, following step number two, the descriptive analysis and the assessment of relationships between variables in the data were completed.

Adjustment Scheme

Since the sampling fraction and the age structure of the sample varied from study site to study site, an estimate of prevalence made by simply adding together all those infected and dividing by the total number sampled in a given area, for example in Kafr El Sheikh, would be incorrectly weighted. To adjust for this, a procedure was formulated using a series of MIDAS commands. An estimated number infected was calculated for each age-sex group for each site in a given area of study. The age-sex specific prevalence at each site was used to make these estimates. The estimated numbers infected in each age group for each site were added together and divided by the sum total of the population of all villages studied in the area. This result was the adjusted age-specific prevalence. The sum of all these estimated to be infected, divided by the total population from all sites, equalled the overall adjusted prevalence for a given area. Sex-specific adjusted prevalences were calculated using the same procedure, but selecting only male or female cases.

CHAPTER V

RESULTS AND DISCUSSION

PARASITIC INFECTIONS

The general overall crude prevalence in the samples of the four major rural study areas; the north central delta, Upper-Middle Egypt, Upper Egypt, and New Nubia has been determined. Table 9 is a master table showing the percent positive by each village site for all parasites screened for in the examination of the stool. This table also includes data obtained on the presence and type or absence of a latrine and whether or not it was used, and data on the number of persons per house. A separate table, Table 10 , was prepared to show the distribution of water supply in the different study areas or regions. The number of persons per standpipe (a public spigot) by village, however, is given in Table 9.

It should be noted that the different categories in Table 10 are not mutually exclusive. Each cell in the table could reach 100%. The percentages shown simply indicate a preference of water source. For example; in the first column, 90% of the population in Kafr El Sheikh stated that their drinking water was obtained from public standpipes; 19.4% cited the canal as a source or at least 9.4% obtained drinking water from both sources. (When significant tests were used to determine if the source of water was related to the prevalence of a specific parasite, this "overlap" was corrected for by selecting a program which created exclusive categories and eliminated cases which had claimed more than one source.)

The results of Table 10 clearly demonstrate the demand for protected water sources. The corresponding figures in Table 9 show the number of persons per standpipe and reveal the intense use placed on these sources. The lowest number of persons per standpipe was 85; some villages had no piped sources at all, and the overall means of 407 persons per standpipe in the downstream study sites is somewhat higher than that suggested by Furina (1975). Obviously such an intense competition for protected water supplies limit its usefulness and potential benefit. Although the data in Table 11 do not strongly suggest a relationship between the prevalence of the helminthic and protozoan parasites, except for the schistosomes, every attempt should be made to improve and expand this service.

The infection of the sample with helminthic parasites was found to be remarkably low, as can be seen in Table 9. The prevalence of hookworm, *H. nana* (dwarf tapeworm), *Taenia* (beef or pork tapeworm), and *Enterobius* (pinworm) were low in all study areas including the Nubians. *Ascaris* was only moderately elevated in the Nile Delta study sites (8.4%) but not elsewhere. The *Entamoeba* infections were by far the most prevalent and were found consist-

TABLE 9

Water Supply, Sanitation and Prevalence of Parasitism in Rural Egypt

Variable	NILE DELTA (Kafr El Sheikh)						MIDDLE NILE (Beni Suef)					
	El Agazein 16	El Hamra 17	Mahalet El Kasab 18	Mahalet Moussa 19	Sheno 20	TOTAL Delta	Barout 11	Shrief Pasha 12	Naiim 13	Beni Adi 14	Ashmant 15	TOTAL Middle Nile
Ascaris lumbricoides	4.8	4.1	19.1	7.3	8.9	8.4	1.3	1.0	3.6	3.7	0.3	2.1
Ancylostoma doudenale	0.7	1.5	0.8	1.8	2.9	1.5	0.3	4.1	0.3	5.0	5.3	3.3
Chilomastix mesnili	0.1	0.5	0.2	0.2	0.0	0.3	0.3	0.6	0.1	0.3	0.5	0.4
Dientamoeba fragilis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Endolimax nana	0.1	0.2	0.3	0.0	0.4	0.2	0.7	0.2	0.1	0.5	0.2	0.3
Entamoeba hartmanni	1.2	2.3	0.9	0.6	1.2	1.1	0.7	1.3	0.4	1.8	2.0	1.8
Entamoeba coli	46.2	38.4	27.8	32.6	45.5	39.2	52.0	53.1	49.9	49.3	23.8	44.8
Entamoeba histolytica	5.6	6.1	3.8	3.6	2.9	4.5	5.7	7.0	4.5	5.9	5.9	5.8
Enterobius vermicularis	0.5	1.6	0.9	0.8	2.5	1.3	3.0	4.9	1.3	1.3	0.5	2.1
Fasciola gigante	0.2	0.4	0.5	0.0	0.4	0.3	0.0	0.0	0.0	0.0	0.0	0.0
Fasciola hepatica	0.0	0.4	0.5	0.2	0.2	0.2	0.0	0.2	0.0	0.2	0.0	0.1
Giardia lamblia	12.0	4.6	2.5	6.3	4.7	6.2	6.0	3.2	3.8	2.7	3.1	3.5
Hymenolepis nana	1.8	2.6	1.3	3.6	2.8	2.3	1.0	1.4	1.3	1.0	0.3	1.0
Heterophyes heterophyes	0.1	0.5	0.9	0.0	0.4	0.4	4.0	0.3	0.4	0.5	0.8	0.8
Iodamoeba butschlii	0.8	1.3	0.3	0.6	1.0	0.9	0.7	2.1	0.7	1.3	0.5	1.0
Schistosoma haematobium	52.8	34.0	21.2	11.4	19.0	28.5	27.5	16.9	37.3	29.4	27.4	26.7
Schistosoma mansoni	28.4	24.2	15.4	13.7	14.2	19.5	0.0	0.0	0.0	0.0	0.0	0.0
Strongyloides stercoralis	0.2	0.1	0.3	0.4	0.1	0.2	0.0	0.6	0.0	0.3	0.2	0.2
Taenia sp.	0.0	0.1	0.2	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.2	0.1
Trichomanas homilis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trichostrongylus sp.	0.6	2.3	0.8	1.0	0.8	1.1	0.0	0.6	0.4	0.5	0.6	0.5
Trichuris trichiura	0.5	1.6	0.9	0.8	2.5	1.3	3.0	4.9	1.3	1.3	0.5	2.1
Persons/Standpipe	207.0	420.0	508.0	540.0	262.0	299.0	0.0	827.0	201.0	968.0	712.0	928.0
Borehole latrine	1.7	0.7	12.5	6.8	6.3	5.6	0.5	0.0	0.0	11.8	0.9	2.5
Unlined pit latrine	79.6	65.5	76.3	41.1	76.6	69.0	81.0	94.7	71.7	17.6	98.3	82.2
Lined pit latrine	18.8	27.5	11.2	52.1	16.6	24.2	9.5	5.3	28.3	70.6	0.9	16.0
Cesspool/Septic tank	1.0	0.0	0.5	0.6	0.0	1.0	0.0	3.9	10.5	0.0	0.0	9.6
Latrine not used	0.5	0.6	1.3	17.0	0.0	3.2	0.0	3.7	3.9	5.7	0.0	3.2
No latrine present	1.5	13.0	19.7	9.8	8.8	10.4	75.0	67.5	75.7	82.1	9.2	64.6
Persons per household	6	6	8	6	6	6.2	6	7	6	5	6	6
Rooms per house	3	2	4	6	4	3.8	3	3	3	2	5	3.2

TABLE 9 (continued)

Variable	UPPER NILE (Aswan)						NEW NUBIA (Aswan)					
	Kazan Sharq 1	Guzaira 2	Abu Rish 3	Ga'afra 4	Bimban 10	TOTAL Upper Nile	Ballana 5	Tuska 6	Malki 7	Kurta 8	Kalabsha 9	TOTAL Nubia
Ascaris lumbricoides	3.3	4.1	2.9	1.4	3.2	3.1	1.8	2.2	1.9	2.8	2.7	2.3
Ancylostoma doudenale	0.1	0.3	0.0	0.5	1.2	0.4	0.0	0.4	0.2	0.4	0.2	0.3
Chilomastix mesnili	0.1	0.5	0.0	0.2	0.5	0.3	0.2	0.6	0.0	0.4	0.0	0.3
Dientamoeba fragilis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Endolimax nana	0.0	0.8	0.2	0.0	0.0	0.2	0.2	0.3	0.0	0.0	0.2	0.2
Entamoeba hartmanni	1.0	3.0	0.5	1.4	0.9	1.5	1.2	1.8	1.0	0.2	1.0	1.1
Entamoeba coli	30.2	42.5	37.1	22.7	42.7	34.8	52.8	46.5	43.0	42.1	59.4	48.6
Entamoeba histolytica	5.1	8.6	6.2	2.1	4.6	5.5	6.3	6.9	7.9	8.4	8.6	7.5
Enterobius vermicularis	1.2	0.7	1.4	0.7	1.2	1.0	1.4	2.5	1.7	0.4	0.6	1.4
Fasciola gigante	0.0	0.0	0.5	0.0	0.0	0.1	0.2	0.1	0.0	0.0	0.0	0.1
Fasciola hepatica	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.4	0.0	0.1
Giardia lamblia	6.3	12.1	11.2	4.0	12.2	9.0	11.5	0.1	8.9	5.6	7.5	9.7
Hymenolepis nana	9.4	4.9	5.2	2.8	2.3	5.2	5.0	8.5	6.6	3.9	2.3	5.5
Heterophyes heterophyes	0.0	0.5	0.0	0.2	0.2	0.2	0.0	0.0	0.4	0.2	0.0	0.1
Iodamoeba butschlii	1.2	1.3	1.4	0.3	1.4	1.1	1.2	1.3	1.3	1.5	2.7	1.6
Schistosoma haematobium	6.9	0.2	4.2	5.9	24.8	4.2	5.8	3.7	2.0	1.7	32.8	8.8
Schistosoma mansoni	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Strongyloides stercoralis	0.3	0.5	1.4	0.0	2.1	0.7	0.2	0.1	1.2	1.3	8.6	2.1
Taenia sp.	0.1	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Trichomanas homilis	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Trichostrongylus sp.	1.0	0.3	0.2	0.0	0.0	0.1	0.2	0.0	0.2	0.2	0.6	0.2
Trichuris trichiura	1.2	0.7	1.4	0.7	1.2	1.0	0.0	0.1	0.2	0.0	0.0	0.1
Persons/Standpipe	0.0	503.0	638.0	85.0	0.0	244.0	474.0	295.0	195.0	735.0	449.0	365.0
Borehole latrine	23.1	5.5	0.0	7.8	1.1	12.5	2.1	0.0	0.5	1.7	1.0	1.0
Unlined pit latrine	69.2	84.0	43.8	90.2	0.0	60.0	3.7	2.6	0.5	97.8	99.0	40.5
Lined pit latrine	7.7	12.5	56.3	2.0	98.9	32.0	94.1	97.4	99.0	0.6	0.0	58.5
Cesspool/Septic tank	0.0	0.5	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0
Latrine not used	0.0	0.5	0.0	0.0	1.0	1.0	0.0	0.5	0.0	4.1	0.0	1.0
No latrine present	34.7	3.3	85.0	59.2	49.5	42.3	0.0	0.0	0.0	0.0	0.0	0.0
Persons per household	5	5	6	4	4	4.7	4.6	4.6	4.1	2.3	3.8	3.9
Rooms per house	3	4	6	5	2	3.9	3.2	3.1	2.9	3.3	2.7	3.0

TABLE 10

Water Supply By Use and Study Area

WATER USE AND SOURCE	PERCENTAGE DISTRIBUTION		
	Nile Delta Kafr El Sheikh	Middle Nile Beni Suef	Upper Nile Aswan
Drinking - courtyard tap	4.2[1]	0.3	0.0
public standpipe	90.0	8.3	61.3
handpump-yard	0.0	1.3	10.9
handpump-outside	0.0	15.9	3.1
canal or drain	19.4	0.8	0.6
Nile	0.0	0.0	24.3
Bathing - courtyard tap	4.2	0.2	0.0
public standpipe	78.0	8.2	61.3
handpump-yard	0.0	1.1	10.9
handpump-outside	0.0	15.3	3.1
canal or drain	66.5	1.8	0.6
Nile	0.0	0.0	24.3
Laundry - courtyard tap	2.2	0.2	0.0
public standpipe	62.7	5.4	61.3
handpump-yard	0.0	1.1	10.9
handpump-outside	0.0	11.9	3.1
canal or drain	64.3	7.4	0.6
Nile	0.0	0.0	24.3
Utensils - courtyard tap	1.8	0.2	0.0
public standpipe	61.8	4.9	61.3
handpump-yard	0.0	1.1	10.9
handpump-outside	0.0	11.8	3.1
canal or drain	63.5	6.6	0.6
Nile	0.0	0.0	24.3
Animals - courtyard tap	0.6	0.0	NI*
public standpipe	2.6	0.1	
handpump-yard	0.0	0.0	
handpump-outside	0.0	0.7	
canal or drain	61.2	8.1	
Nile	0.0	0.0	

[1] The different categories are not mutually exclusive. *No information

TABLE 11

Relation of Water Supply to Parasites in the Nile Delta (Kafr El Sheikh), 1976

INFECTION		PERCENT PREVALENCE BY WATER USE			
	WATER SUPPLY	Drinking	Bathing	Laundry	Utensil Cleaning
Ascaris lumbricoides					
	House Conn.	7.1	7.1	7.1	7.1
	Standpipe	11.5	11.2	11.9	11.6
	Canal	13.7	14.0	12.3	12.9
Ancylostoma duodenale					
	House Conn.	0.0	0.0	0.0	0.0
	Standpipe	0.8	0.4	0.4	0.4
	Canal	4.2*	4.7*	4.1*	4.0*
Entamoeba coli					
	House Conn.	42.9	42.9	42.9	42.9
	Standpipe	32.1	32.0	31.1	30.9
	Canal	33.7	33.6	35.2	35.5
Entamoeba histolytica					
	House Conn.	7.1	7.1	7.1	7.1
	Standpipe	2.3	2.4	2.6	2.6
	Canal	4.2	3.7	3.3	3.2
Giardia lamblia					
	House Conn.	0.0	0.0	0.0	0.0
	Standpipe	5.3	5.6	4.7	4.7
	Canal	4.2	3.7	5.7	5.6
Schistosoma haematobium					
	House Conn.	13.3	13.3	13.3	13.3
	Standpipe	19.2	20.0	18.2	18.0
	Canal	33.3	32.8	34.6	34.6
Schistosoma mansoni					
	House Conn.	6.7	6.7	6.7	6.7
	Standpipe	12.3	12.8	11.9	11.7
	Canal	24.7	21.4	22.1	22.0

*Significant, chi square 0.05 or less.

ently high in all study sites.

It became apparent very early in the examination of the stool specimens that the helminthic infections, *Ascaris* and *Ancylostoma* were being detected at a frequency much lower than expected. A quick glance at Table 2 shows that both infections were much higher in the past. The expectation that higher frequencies should be observed resulted in a close evaluation of the MIFC technique and its employment. The MIFC protocol was reviewed as well as the cytological features of the respective ova. Both aspects were found to be correctly used, as neither method truly qualifies as a technically difficult procedure. Furthermore, the genus *Entamoeba* was readily and frequently identified in the specimens as well as the helminth *S. mansoni*. Specimens obtained elsewhere and known to be positive for either *Ascaris* or *Ancylostoma* were correctly identified without fail using the MIFC procedure. The conclusion is that these two helminthic infections, *Ascaris* and *Ancylostoma*, have decreased in our sample sites over the period of a decade. (The time span between this study and the most recent historical data is 10 years.)

As was pointed out, direct comparisons between prevalence studies in Egypt are limited. However, the differences seen between this study and past studies in regard to these two helminthic infections is dramatic and too great to be explained on methodological differences alone. The past evidence clearly points to a much higher prevalence. Assuming that the sample sites studied here were not freakishly typical, and the prevalence for these two parasites have indeed fallen, then the most probable explanation for decreases in the infections is the wholesale distribution of pharmaceuticals such as piperazine. All rural health centers and units stock this drug and prescribe it frequently at little or no cost to the patient. Furthermore, this drug was frequently sited on the data forms as having been prescribed within the previous year of the study.

The exposed foot is the classic portal of entry by the infective larvae of *Ancylostoma*. For a number of years now, cheap plastic footwear has been available to the population in general and especially to the lower social-economic classes. The use of this footwear breaks the hookworm transmission cycle. The readily observable use of plastic footwear, of any kind, throughout rural Egypt has no doubt contributed to a decline in the prevalence of this infection.

There were significant differences between study sites in a given area. Notable is the hookworm distribution in Aswan where the non-desert villages of Bimban (10) had more hookworm (1.2%) than any of the other "desert type" villages. Also interesting is the decrease in *Ascaris* infection outside the delta. Although the prevalences are much lower, the distribution still parallels that found previously by Scott (1937a), i.e. decreasing from north to south. No significant differences were seen between sexes or age for *Ascaris* infections. Prevalence in the very young ages were as high as the older ages. Unique age or sex distributions were not noted for any of the parasites investigated. (The tables depicting age-sex prevalence relationships and other descriptive aspects are included in an appendix for tables.) This rather unusual arrangement for tables was prepared because of the very large number of tables prepared for this report, greater than one hundred. The vast majority of these tables are basically descriptive and include tables with information on the environmental parameters that were also measured. Specific information sought for from these tables should be made by subject as each table's heading is indexed on the front pages of the table appendix.

The presence of a latrine was significantly associated with a reduced prevalence in Ascaris infection, Kafr El Sheikh and Beni Suef, but not in Aswan. Table 12 shows these results in addition to five other selected parasites. Generally, the results were not encouraging. Only in one other case was the presence of a latrine favorable, i.e. for E. coli infections in Beni Suef.

The high prevalence of the Entamoeba species indicates that personal hygiene for the populations sampled is still inadequate. The quality of water supply did not relate well to the prevalence of these organisms either. (See table appendix on parasitic infections and water supplies.) This may be a reflection of limited water supply and use.

TABLE 12

Relationship Between Latrine and Infection With Selected Parasites in the Three "Downstream" Study Areas

PARASITE	PERCENT POSITIVE Kafr El Sheikh Latrine Yes	 Kafr El Sheikh Latrine No	 Beni Suef Latrine Yes	 Beni Suef Latrine No	 Aswan Latrine Yes	 Aswan Latrine No
A. lumbricoides	8.0	12.0	0.7	3.2	3.9	2.1
Ancylostoma	1.4	1.1	4.0	2.6	0.3	0.3
H. nana	2.4	1.1	1.0	1.2	5.7	4.7
G. lamblia	6.5	5.1	3.5	3.4	10.9	6.4
Entamoeba coli	40.5	33.0	39.4	49.4	37.2	31.4
E. histolytica	4.5	3.7	6.0	5.4	7.2	5.2

Table 13 shows the percentage of persons infected with any single parasite and any two or more parasites. The sampled population from Beni Suef had consistently higher numbers of positives than the other two downstream locations sampled.

Table 14 is a summary of the percent positive in all four study areas. The table was constructed to give the reader a quick overview of the findings for eight of the more prominent parasitic infections screened for in this study.

TABLE 13

Multiparasitic Infections in the Study Areas

NUMBER OF INFECTIONS	PERCENT POSITIVE/CASES		
	Kafr El Sheikh	Beni Suef	Aswan
Any one parasite	42.7/1557	53.2/1518	42.7/1227
Any two parasites	20.1/ 731	44.5/1271	15.6/ 449
Any three parasites	5.2/ 188	14.5/ 414	3.7/ 107
Any four parasites	0.9/ 31	3.2/ 91	1.0/ 28
Any five parasites	0.1/ 5	0.4/ 11	0.1/ 4

TABLE 14

Percent Positive of Selected Parasites By Study Area

PARASITE	AREA			
	Kafr El Sheikh	Beni Suef	Aswan	Nubia
Ascaris lumbricoides	8.4	2.1	3.1	2.3
Enterobius vermicularis	1.3	2.1	1.0	1.4
Ancylostoma duodenale	1.5	3.3	0.4	0.3
Taenia sp.	0.1	1 case	2 cases	0.0
Hymenolepis nana	2.3	1.0	5.2	5.5
Giardia lamblia	6.2	3.5	9.0	9.7
Entamoeba histolytica	4.5	5.8	5.5	7.5
Entamoeba coli	39.2	44.8	34.8	48.6

The results of the Nubian study were based on methodologies and sampling sites used by Zawahry in 1964 (as described in the methods section) just prior to their relocation in Kom Ombo. This design was selected in order to strengthen the validity of comparisons between the results of these two studies.

Table 15 shows the prevalence for the same eight parasites mentioned above and the respective prevalence levels before and after relocation. No cases of hookworm infection were seen in Old Nubia (Table 2). Seven cases were detected by this study; perhaps as results of the increase in sample size over the one in 1964 by a factor of four.

TABLE 15

A Comparison of Parasite Prevalence (%)
Before and After Resettlement in Nubia

PARASITE	1964*	1976
Ascaris lumbricoides	6.6	2.3
Hymenolepis nana	7.7	5.5
Enterobius vermicularis	0.1	1.4
Taenia sp.	0.1	0.0
Entamoeba histolytica	3.2	7.5
Entamoeba coli	34.3	48.6
Giardia lamblia	2.7	9.7

*After Zawahry, 1964.

Overall, there was very little meaningful change in the prevalence of these parasitic infections. Except for *Entamoeba*, the prevalence levels were favorably low before and after resettlement. It was expected that the increased crowding necessitated by the resettlement plan would result in an increase in a number of communicable infections including the parasite diseases mentioned here. The slight increases seen in the protozoan infections may be a result of this change in living conditions. This increase can only be considered alarming if it indicates a continued upward trend. Follow-up surveillance is needed however, before this can be determined.

ENVIRONMENTAL FACTORS

Critical environmental measures such as water supply and water disposal were analyzed in the previous section under Parasitic Infections in a brief attempt to establish a relationship or association between these two variables. There are other interesting descriptive features concerning the water, wastewater and other environmental variables that were measured and should be elaborated on. (The details of the environmental data can be found in the appendix for tables; subheading Environmental Measures.)

The outstanding features, however, are the fact that protected water supplies are present in almost every Egyptian village, and more rural houses in the sample had a latrine than did not. Two of the three village standpipes relied heavily on ground water raised by handpumps. Only the villages of Kazan Sharq (1) did not have some type of protected source and were forced to carry from the river bank. Even here, public standpipes were being installed as the field activities for this study were closing in the fall of 1976.

THE NUBIANS

In terms of water, wastewater and housing, the Nubians benefited by their relocation to Kom Ombo enormously. All the new houses have electricity or have readily available points for connections into the village supply. Many homes, especially in Kurta (8), sprout television antennae. (Most villages of rural Egypt now have at least one television set, usually located at a village tea house. Small cheap battery-driven radios are also common and provide the creative environmental health worker with an important mechanism for the development of environmental health education and awareness.) All Nubian homes have latrines and the only source of water for the new Nubian homes is from public standpipes. Furthermore, the Nubains now have access to the medical care system through the rural health centers and units found throughout the resettlement area. Schools, social centers and club buildings have also been provided. The mere fact that the Nubians are no longer a remote population, difficult to travel to, and remote from the mainstream of Egypt's overall development, is an environmental improvement in itself. It is unfortunate that many Nubians have voiced a desire to return to old Nubia by establishing new settlements along the shores of Lake Nasser. To do so would: (1) dangerously expose them to schistosomiasis transmission via the Lake Nasser fishermen who have been found to have a high prevalence of this infection in their own groups (Dazo and Biles, 1971); and (2) to provide a mechanism of malaria transmission from the Sudan into the downstream populations of rural Egypt (not to mention the devastating effect malaria would no doubt have on their own populations).

THE DOWNSTREAM STUDY SITES

Upper-Middle Egypt (Beni Suef) had more persons per standpipe and fewer homes with latrines than did the other two downstream study areas, 928 and 64.6% respectively. It is interesting that the multiparasitic infections (Table 13) are higher in this area also.

The typical village house in the three downstream study sites was made of mud brick with a packed earth floor. Stone, red brick, or mud and red brick were also common. Few houses examined stood alone. Many were bound on three sides (65.2% in El Hamra (17), Kafr El Sheikh) and reflect the close housing patterning necessitated by a limited amount of agricultural land, characteristic of Egyptian villages, towns and cities. Actually, crowding (persons per room) is less severe in the rural areas than in the urban ones. (Obtained from the results of comparing figures from this study with data collected by the 1960 census; Capmas.) Although conditions have changed since 1960, the direction has been entirely toward the urban centers. Severe crowding conditions in the home could not be described for Aswan and Nubia even if the rooms of these homes were small. The stable (used for chickens, rabbits, ducks, goats, etc.), when located within the confines of the house (typically adjoining the courtyard), is a serious environmental hazard. Most homes in Kafr El Sheikh or Aswan had them inside. The Nubian homes were designed with inside stables.

The stable floors are intense fly-breeding areas and are used in some homes as a handy and secluded location for defecating (Headlee, 1933). It is obvious that the transmission of a number of communicable diseases, including several infections not measured by this study, could be enhanced by the presence of the stable. The stable is an important site for improvement and must be included in environmental health programs. Currently, they are not.

Related to the stable and domestic animals is cooking with dried dung cakes. A detailed assessment was made on what different types of fuels were used for cooking. Dung alone was used most frequently in Beni Suef, and dung in combination with some other fuel (kerosene or charcoal) was by far the most commonly sited source of cooking fuel. Fewer studied homes in Aswan cooked with dung than in the other downstream sites. It appeared that if other cooking fuel, besides dung, could be obtained it was preferred. Every attempt should be made to help the villager exercise this preference.

Animal waste may frequently be dumped in the street, in the yard or stable (where it originated), or sometimes in the canals. The street, where all village household wastewater is disposed, also is the most common site for dumping animal waste material. In the dry, hot south of Upper Egypt, desication remedies a sizable proportion of this problem. In the delta, especially during the wetter months, the unpaved village streets may become almost septic and impassable.

An encouragable number of homes were painted (inside, outside, or both) and many had electricity. The villages of Aswan, of course, benefitted most from the nearby location of the High Dam, but the results indicate that rural electrification programs are extensive and most likely growing. There was at least one or more television sets in every village.

The pit latrine was the type of latrine most frequently seen and by far the major of these latrines were sited as inside the house. Only in Bimban (10) were latrines most often located in the stable. Some had latrines and did not use them, especially in Mahalet Moussa (19), Kafr El Sheikh (17.0%).

The shortage of water for the home is interesting. Throughout the country-side, and seen also in urban locations where people congregated, are zirs or large earthenware water containers. These containers hold about 20 liters, have tapering pointed bottoms, and are slightly porous. Because of the pointed ends, various types of support structure are necessary, for the vessel will not otherwise stand. Furthermore, the vessel is supported so that the pointed tip does not touch the ground. The zir when full, "sweats", that is, small amounts of water seep through the pores and blankets the vessel in a wet film of water that collects at the pointed tip and is used for drinking. The "sweating" also provides a measure of coolness to the container due to rapid evaporation in the hot and dry climate of Egypt.

Water for drinking is also obtained directly from within by, more often than not, a tin can. Some zirs have lids.

Over 95% of the homes studied had zirs and used them to store water collected either from standpipes, handpumps, canals or other sources. Even homes with piped in water supplies (for example, a single tap in the courtyard) would use the zir to store the family's water supply. One might wonder why water would be stored in an earthenware zir when a piped source is available. The reasons are (1) because the water supply via the pipe is erratic; (2) the water from the zir is cooler; and (3) in the opinion of the rural Egyptian who has been drinking from the zir all of his or her life--water tastes best from a zir. All water that comes into the house, where it was used for drinking, cooking, washing, laundry, etc., passes through the zir storage container. From personal observation, it seemed that bigger houses and families had more zirs. The investigators were often told that the dried pit of the apricot would be ground into powder and added to the turbid water of the zir, apparently as a coagulant. These points are made because any health improvement program must consider the hygienic characteristics of the zir, and the role it plays in the rural Egyptian household.

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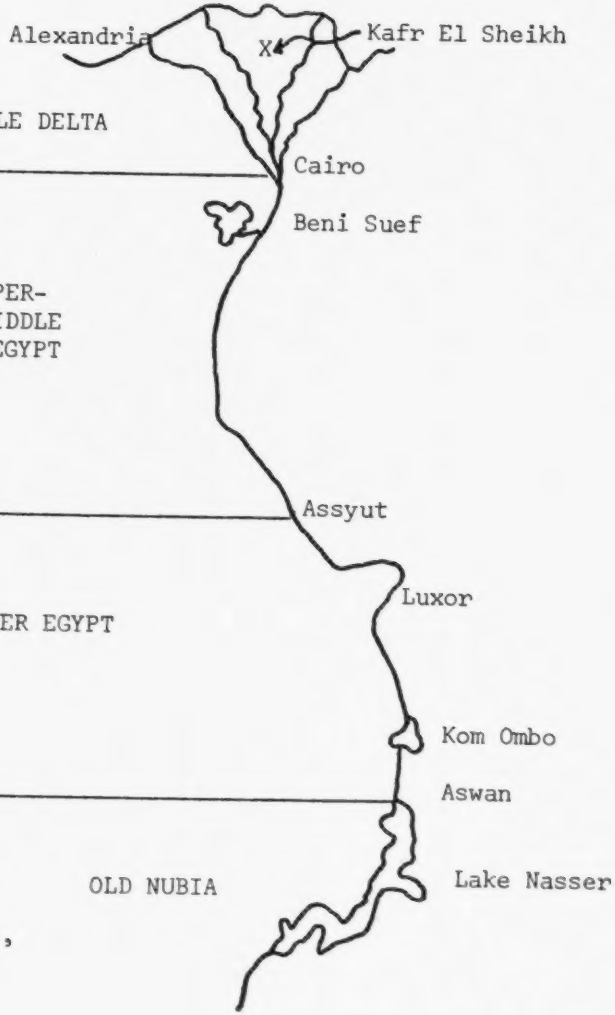
APPENDIX I.1

COMPOSITE TABLE FOR ENVIRONMENTAL FACTORS

Environmental Factors

Piped water % 1952	Piped water % 1966	Piped water % 1976	$\overline{X}$ persons/ standpipe 1976	% with latrines 1952	% with latrines 1966	% with latrines 1976	
10	88	79	323	31	52	90	NILE DELTA
		31[1] 52[2]	928			35 27[2]	UPPER-MIDDLE EGYPT
		82[3]	243			58	UPPER EGYPT
							OLD NUBIA


Alexandria
X
Kafr El Sheikh
Cairo
Beni Suef
Assyut
Luxor
Kom Ombo
Aswan
Lake Nasser

---

[1] 60% obtained drinking water from outside handpumps

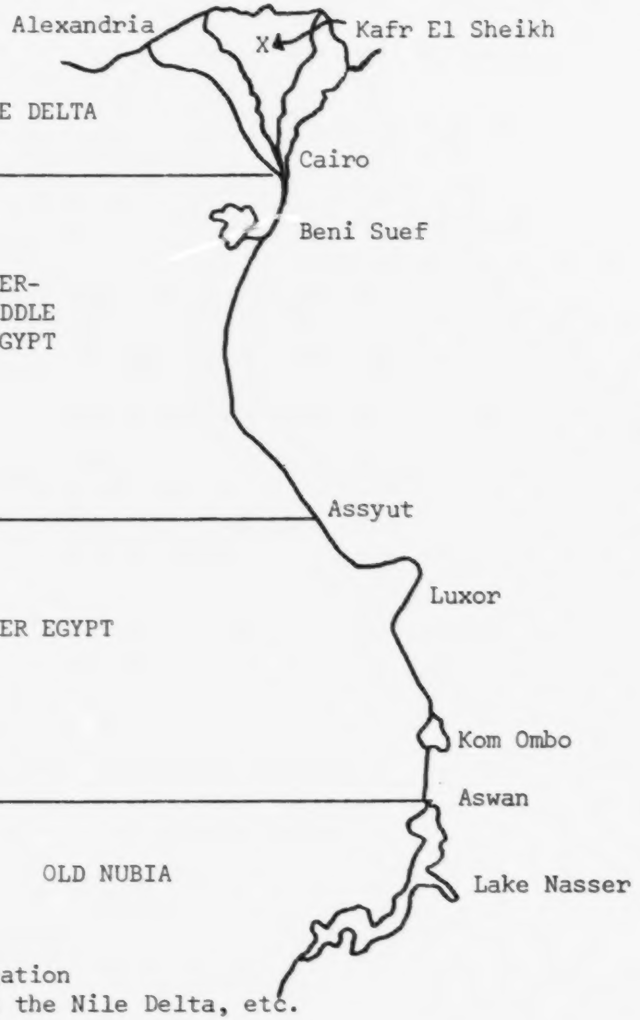
[2] Data from Hassouma (1975)

[3] 96% in Bimban, which was not included in this figure, had access to handpumps.

APPENDIX I.2

COMPOSITE TABLE FOR IRRIGATION AND POPULATION

Irrigation			Population	
1935	1955	1976	1976	
6+	6+	6+[1]	11,635,949 59.4%	NILE DELTA
+ + + +	+ + + +	+ + + +	4,772,647 24.4%	UPPER-MIDDLE EGYPT
- - -	+ - +	+ + +	3,224,260 16.2%	UPPER EGYPT
- - -	-[2] + +			OLD NUBIA


Alexandria
X
Kafr El Sheikh
Cairo
Beni Suef
Assyut
Luxor
Kom Ombo
Aswan
Lake Nasser

---

[1] Each plus represents the presences of perrennial irrigation schemes in a governorate. There are 6 governorates in the Nile Delta, etc.

[2] This is from 1964 data

APPENDIX II.1

Tabulations of Housing Variables by Study Sites,
Percent of Houses with Attributes
(not including the Nubian study sites)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Construction Material															
Stone or Red Brick	10.4	8.5	62.6	0.0	2.6	7.5	10.9	2.4	4.1	4.0	25.6	4.5	10.5	23.4	11.7
Mud Brick	78.1	12.1	1.6	87.6	94.8	86.9	61.2	56.6	91.9	58.8	69.8	91.5	84.3	71.6	70.6
Wood or Reed	0.5	0.0	0.0	0.0	1.6	0.0	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1.4
Mud and Red Brick	8.9	79.5	32.5	1.0	0.0	1.9	27.4	38.2	4.1	32.7	3.5	1.0	2.6	5.1	16.4
Red Brick and Wood or Reed	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0
Red Brick and Mud Brick and Wood or Reed	0.5	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Mud Brick and Wood or Reed	0.0	0.0	0.8	0.0	0.0	3.7	0.0	1.9	0.0	3.5	1.0	2.0	0.0	0.0	0.0
No Information	1.6	0.0	0.0	11.4	1.0	0.0	0.0	0.5	0.0	0.5	0.0	0.5	2.6	0.0	0.0

II.1.2 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Structure Attachment															
Detached	9.0	5.4	4.1	9.9	3.5	2.7	0.7	1.0	3.2	1.7	9.3	0.0	8.3	20.5	9.5
One Side Only	43.7	24.6	13.0	39.6	11.3	6.4	5.6	21.0	5.5	4.0	21.0	4.5	17.6	37.3	13.1
Two Sides	41.3	39.7	34.1	44.0	57.9	48.4	24.9	51.5	29.3	23.0	64.1	30.3	54.9	41.0	77.4
Three Sides	6.0	30.4	48.8	6.6	27.4	42.5	68.8	26.5	62.0	71.4	5.6	65.2	19.3	1.2	0.0
Staircase															
Fixed	15.7	6.7	11.5	0.0	6.7	72.0	77.0	68.6	58.2	59.8	71.7	92.4	44.2	7.8	58.3
Mobile	2.3	2.7	1.6	1.1	35.0	9.7	7.9	5.1	12.0	27.2	26.6	4.1	36.0	76.8	32.8
None	82.0	90.6	86.9	98.9	58.3	18.3	15.1	26.3	29.8	13.0	1.7	3.5	19.8	15.4	8.9
Television															
Present	5.5	16.3	0.8	3.6	1.4	4.2	3.0	3.5	0.3	3.0	2.6	2.8	4.3	4.1	0.7
Not Present	94.5	83.7	99.2	96.4	98.6	95.8	97.0	96.5	99.7	97.0	97.4	97.2	95.7	95.9	99.3

II.1.3 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Ownership															
Own	40.3	12.1	5.7	4.2	4.8	1.9	7.5	0.9	2.0	6.1	2.0	1.0	4.7	10.4	0.9
Rent	59.2	87.5	86.2	95.8	94.1	89.7	89.9	98.1	76.0	93.4	98.0	99.0	94.2	89.1	93.4
No Information	0.5	0.4	8.1	0.0	1.1	8.4	2.5	0.9	21.9	0.5	0.0	0.0	1.1	0.5	5.7
Stable															
Inside	59.4	79.5	65.9	71.0		Data Not Available					79.6	73.8	63.7	57.3	73.1
Outside	10.4	2.7	22.0	10.0							3.5	3.3	7.3	4.4	4.2
None	20.8	15.2	11.4	7.1							15.6	7.0	27.1	38.1	15.5
Inside and Outside	0.5	0.4	0.8	0.0							0.0	0.0	0.6	0.0	0.0
No Information	8.8	2.2	0.0	11.9							1.3	16.0	1.3	0.2	7.3
Waste Container															
Yes	10.2	88.8	2.4	39.1							1.2	2.3	3.2	1.8	26.9
No	89.8	11.2	97.6	60.9							98.8	97.7	96.8	98.2	73.1

II.1.4 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Painted Walls															
Exterior	5.7	2.2	26.0	14.3	6.8	3.7	0.5	1.9	2.0	1.0	1.5	3.5	5.8	3.0	4.2
Interior	5.7	6.3	52.0	26.2	15.7	7.5	13.4	7.5	3.0	7.0	18.1	10.6	16.8	28.9	11.7
None	14.1	23.2	3.3	47.1	77.5	76.6	73.6	9.0	85.3	62.3	76.4	81.9	62.8	55.3	82.2
Exterior and Interior	70.8	67.4	18.7	0.0	0.0	12.1	11.4	78.3	9.1	27.1	4.0	3.0	13.1	11.2	1.4
No Information	3.6	0.8	0.0	12.4	1.0	0.0	1.0	3.4	0.5	2.5	0.0	1.0	1.6	1.5	0.5
Lighting															
Electricity	46.9	79.9	44.7	40.5	14.1	28.0	22.4	31.6	0.0	36.7	50.3	7.0	30.4	2.0	0.0
Kerosene	46.9	19.6	42.3	47.1	85.9	66.4	74.1	67.0	99.0	61.8	47.7	88.4	68.1	97.5	99.1
Other	0.0	0.4	0.0	0.5	0.0	0.9	1.0	0.5	0.5	1.0	0.0	0.0	0.0	0.5	0.9
Electricity and Kerosene	0.0	0.0	7.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	4.5	0.0	0.0	0.0
Kerosene and Other	0.0	0.0	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Information	6.3	0.0	0.0	11.9	0.0	4.7	2.5	0.9	0.5	0.5	0.0	0.0	1.6	0.0	0.0

II.1.5 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Wastewater Drainage															
Concrete	5.1	2.8	0.0	1.1	0.0	0.0	0.0	2.9	0.0	0.5	0.0	1.0	2.7	1.0	1.8
Pipe	3.4	0.0	1.7	0.5	0.0	1.8	0.5	0.5	1.0	0.0	5.0	0.0	0.0	0.5	19.4
Brick	1.7	0.0	0.8	1.1	0.0	1.8	0.0	0.0	0.0	0.0	49.2	0.0	1.1	0.0	0.5
Tile	1.7	0.0	0.8	0.5	0.0	1.8	0.0	1.0	0.0	0.0	2.5	0.0	3.7	0.0	0.5
Earth	20.3	96.3	71.2	95.6	100.0	93.6	98.4	92.3	7.6	0.0	43.2	0.0	92.0	98.5	73.7
Other	67.8	0.9	25.4	1.1	0.0	0.9	1.0	3.3	91.4	99.0	0.0	99.0	0.5	0.0	4.1

II.1.6 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Storage Place for Fuel Materials															
Roof	3.6	10.7	7.3	47.1	8.4	82.2	88.6	79.2	73.6	95.5	100.0	98.0	95.4	94.9	94.4
Stable	3.1	10.3	15.4	25.2	27.7	3.7	1.5	4.2	0.0	0.5	0.0	0.5	1.0	0.5	1.4
Storage Room	1.6	3.1	61.8	14.3	33.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	2.1	2.5	0.5
Yard	59.9	75.0	15.4	1.9	29.8	7.5	8.5	14.6	25.9	2.0	0.0	1.5	0.0	2.0	3.7
None Present	0.0	0.4	0.0	0.0	0.0	0.9	0.9	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Roof and Storage Room	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Roof and Yard	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Stable and Storage Room	0.5	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Information	31.3	0.0	0.0	11.4	1.0	3.7	0.5	1.4	0.5	1.5	0.0	0.0	1.0	0.0	0.0

II.1.7 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Roof Material															
Concrete	7.8	3.1	0.8	1.0	1.0	2.8	0.5	1.4	1.0	0.5	12.1	5.0	8.9	13.7	7.9
Wood	2.1	4.0	0.8	3.8	1.0	9.3	11.4	20.3	72.6	0.5	1.5	3.5	2.1	4.6	2.3
Reed	1.0	6.3	2.4	2.4	95.8	8.4	40.3	10.4	15.7	4.5	0.0	0.5	0.5	2.0	1.9
Mud	66.7	73.2	40.7	81.4	2.1	37.4	3.0	0.5	0.0	1.5	1.0	0.0	0.0	0.0	80.4
Concrete and Wood	0.5	0.4	0.0	0.0	0.0	0.0	0.0	2.8	0.0	0.0	1.0	0.0	0.5	3.0	0.0
Concrete and Mud	1.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	4.7
Concrete and Wood and Reed	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.5	0.0	0.0
Wood and Reed	0.0	2.2	0.0	0.0	0.0	6.5	11.4	49.5	9.6	3.0	2.0	87.4	29.8	75.6	0.0
Reed and Mud	1.0	5.8	30.1	0.5	0.0	31.8	29.9	9.4	0.0	7.5	0.0	0.0	19.9	0.0	0.5
Concrete and Reed	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.5	0.9
Wood and Reed and Mud	0.0	0.0	24.4	0.0	0.0	0.9	3.0	0.0	0.0	54.8	79.4	3.0	23.6	0.0	0.5
No Information	19.3	4.5	0.8	11.0	0.0	2.8	0.5	5.7	1.0	26.6	2.0	0.5	13.6	0.0	2.9

II.1.8 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Floor Construction															
Earth	56.3	26.8	91.1	83.8	95.3	85.0	80.6	87.3	90.9	78.9	86.4	97.5	89.0	81.7	94.9
Concrete	21.9	0.9	0.0	1.9	3.7	3.7	0.5	0.0	1.0	0.0	2.0	1.0	1.0	0.5	1.4
Tile	7.3	5.4	0.0	0.0	1.0	4.7	5.5	2.8	4.1	6.0	6.5	0.5	4.7	9.1	1.4
Wood	0.0	0.4	0.0	1.0	0.0	1.9	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.5	0.5
Earth and Concrete	3.1	25.0	0.0	0.0	0.0	0.0	0.5	2.4	0.0	0.5	0.0	0.5	1.0	1.0	0.9
Earth and Tile	1.0	18.8	0.0	0.5	0.0	1.9	6.5	6.6	3.0	14.1	0.5	0.0	2.1	0.0	0.0
Earth and Wood	0.0	0.0	8.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.5	0.5
Earth and Concrete and Tile	0.0	20.1	0.0	0.0	0.0	0.5	0.5	0.0	0.0	0.0	1.0	0.0	0.0	0.5	0.5
Concrete and Tile	0.0	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.0	1.5	0.0
Tile and Wood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.5	4.1	0.0
No Information	10.4	0.0	0.8	12.9	0.0	2.8	6.0	0.9	0.5	0.5	0.0	0.0	1.6	0.5	0.0

II.1.9 (continued)

Number of Persons Living in House	Village Study Site Aswan 1	2	3	4	10	Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
1	4.7	4.0	2.6	15.5	12.2	1.2	1.2	1.1	4.9	1.3	0.8	0.6	0.1	2.0	0.7
2	9.4	4.9	3.5	15.0	13.8	1.7	4.3	3.4	9.5	3.6	6.1	5.1	1.4	8.4	7.3
3	14.1	6.7	7.0	15.5	18.0	4.6	7.9	7.1	8.5	6.5	11.9	9.0	3.4	8.3	8.6
4	18.8	14.3	7.8	19.3	11.6	13.0	9.5	8.6	15.5	15.6	11.3	14.7	7.4	15.1	12.0
5	22.9	20.6	11.3	14.4	10.1	26.3	10.8	11.8	16.1	14.5	20.5	15.8	5.4	10.7	16.0
6	11.2	8.5	13.9	10.2	7.9	16.2	13.4	17.3	16.5	14.8	16.3	13.4	14.2	18.5	15.4
7	10.6	9.0	8.7	5.9	6.9	9.4	15.9	10.9	13.0	14.4	20.3	12.2	11.9	7.4	12.4
8	4.7	13.5	9.6	2.7	6.3	6.5	8.6	17.4	7.6	7.5	6.9	9.8	12.8	13.1	11.8
9	1.2	7.6	7.0	1.1	4.2	7.2	9.4	8.0	6.1	12.5	3.9	15.4	6.8	8.9	9.7
10	1.2	3.1	6.1	0.5	1.1	5.6	4.0	4.8	0.0	1.8	2.2	1.8	6.6	1.5	4.8
More than 10	1.2	7.5	15.5	0.0	7.8	8.3	15.0	9.6	2.3	7.5	0.0	2.2	30.0	6.1	1.3

II.1.10 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Number of Rooms in House															
1	9.4	5.0	0.0	0.0	25.1	11.9	24.6	12.4	32.7	0.5	1.5	29.9	2.1	1.5	3.7
2	34.3	19.4	4.9	7.0	29.8	28.7	24.1	26.3	26.0	7.6	30.2	35.6	18.1	2.5	17.8
3	29.3	18.9	3.3	11.2	21.5	15.8	21.0	29.2	23.5	16.2	47.2	22.2	23.4	7.6	19.6
4	11.0	17.6	14.6	28.3	11.5	20.8	10.8	13.9	8.2	24.4	17.1	8.8	26.6	9.1	22.4
5	6.1	13.1	13.0	24.1	3.7	9.9	7.2	7.7	4.6	18.3	2.5	1.0	10.6	12.2	9.3
6	4.4	11.3	29.3	10.7	1.6	6.9	4.1	4.3	2.0	13.7	1.0	1.0	7.4	23.9	14.0
7	1.7	6.3	7.3	10.7	1.6	0.0	3.6	3.3	2.0	8.1	0.5	0.5	5.3	33.0	4.2
8	0.6	4.5	16.3	5.3	2.6	3.0	2.6	2.9	0.0	7.1	0.0	0.0	2.7	8.1	3.7
More than 8	3.4	4.3	11.3	2.6	2.5	3.0	2.0	0.0	1.0	4.0	0.0	1.0	3.7	2.0	5.2

II.1.11 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Storage of Water															
Metal	1.6	0.9	0.8	4.8	0.0	1.8	0.0	0.0	0.0	0.0	1.0	0.5	1.6	1.0	0.9
Ceramic	85.7	67.0	97.6	81.2	100.0	96.4	100.0	98.6	100.0	98.0	93.0	95.0	97.9	98.0	98.6
Earthenware	0.5	20.1	0.0	2.9	0.0	0.0	0.0	0.5	0.0	0.5	0.0	4.0	0.0	0.0	0.5
Other	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.5	0.0	0.0	0.5	0.0
Metal and Ceramic	4.2	4.9	0.8	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Metal and Earthenware	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
Metal and Ceramic and Earthenware	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ceramic and Earthenware	0.0	5.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
No Information	6.9	0.4	0.8	11.1	0.0	1.8	0.0	0.5	0.0	1.0	0.5	0.5	0.5	0.5	0.0

II.1.12 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Cooking Fuel															
Gas	1.6	7.1	0.0	0.0	0.0	5.6	1.5	0.5	1.0	0.0	0.0	0.5	1.0	0.0	0.9
Oil	74.0	17.4	15.4	72.9	75.9	9.3	20.4	0.5	14.7	3.0	4.0	2.5	2.1	0.5	9.8
Wood	2.1	0.9	3.3	12.9	22.0	3.7	0.0	0.0	37.1	1.5	2.5	2.5	1.0	0.0	0.5
Dung	2.1	0.0	0.0	3.3	0.0	69.2	34.8	67.5	0.5	43.7	0.0	13.6	1.0	2.0	0.5
Gas and Oil	0.5	0.9	0.0	0.0	0.0	0.0	0.5	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.9
Gas and Wood	0.5	2.2	0.8	0.0	0.5	0.9	0.5	0.0	1.5	0.5	0.0	0.0	1.0	0.5	0.0
Gas and Dung	0.0	24.1	2.4	0.0	0.0	0.0	0.0	2.4	0.0	0.0	0.0	0.5	0.0	0.0	0.5
Gas, Oil and Wood	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.0	0.0	0.0	0.0
Oil and Wood	2.6	1.3	16.3	0.0	0.0	0.9	8.0	0.0	1.5	0.5	13.6	37.2	19.9	64.0	0.0
Wood and Dung	0.5	0.4	21.1	0.0	0.0	4.7	7.0	0.0	42.1	36.2	13.6	11.1	20.9	28.9	0.5
Oil, Wood and Dung	0.0	0.0	24.4	0.5	0.0	0.0	4.0	0.0	0.0	12.1	54.8	26.6	17.8	0.0	0.0
No Information	16.1	45.5	16.3	10.5	1.6	5.6	23.4	27.8	1.5	2.0	10.6	5.5	35.1	3.6	79.4

II.1.13 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Latrine															
Present	65.3	96.7	14.4	40.8	50.5	25.0	32.5	24.3	17.9	90.8	98.5	87.0	80.3	90.2	91.2
Not Present	34.7	3.3	85.6	59.2	49.5	75.0	67.5	75.7	82.1	9.2	1.5	13.0	19.7	9.8	8.8
Is there a cover for the latrine?															
Yes	13.3	96.6	12.4	39.1	50.0	17.4	32.9	23.2	14.1	95.9	78.9	87.9	80.2	2.4	91.0
No	86.7	3.4	87.6	60.9	50.0	82.6	67.1	76.8	85.9	4.1	21.1	12.1	19.8	97.6	9.0

II.1.14 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Type of Latrine															
Borehole	15.4	5.5	0.0	7.8	1.1	9.5	0.0	0.0	11.8	0.9	1.7	0.7	12.5	6.8	6.3
Pit	69.2	84.0	43.8	90.2	0.0	81.0	94.7	71.7	17.6	98.3	79.6	65.5	76.3	41.1	76.6
Masonry Walls	7.7	10.5	56.3	2.0	98.9	9.5	5.3	28.3	70.6	0.9	18.8	27.5	11.2	52.1	16.6
Borehole and Masonry Walls	7.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pit and Masonry Walls	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.3	0.0	0.0	0.5
Water Carriage Present in Latrine?															
Yes	4.0	0.5	0.0	2.3	0.0	0.0	0.6	1.8	0.0	0.0	0.0	0.0	0.6	0.6	0.0
No	96.0	99.5	100	97.7	100	100.0	99.4	98.2	100.0	100.0	100.0	100.0	99.4	98.9	100.0
No Information														0.6	
Septic Tank Present?															
Yes	0.0	0.5	0.0	0.0		0.0	3.9	10.5	0.0	0.0	1.0	0.0	0.5	0.6	0.0
No	100	99.5	100	100		100.0	96.1	89.5	100.0	100.0	99.0	100.0	99.5	99.4	100.0

II.1.15 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Cesspool Present?															
Yes	15.4	0.5	0.0	2.5	0.0	0.0	13.4	6.9	7.9	0.9	16.5	8.3	73.4	6.8	0.9
No	84.6	99.5	100	97.5	100	100.0	86.6	93.1	92.1	99.1	83.5	91.7	26.6	93.2	99.1
Location of Latrine															
Inside	82.1	88.1	77.8	46.3	20.5	88.9	95.5	92.6	91.4	98.3	98.4	94.0	99.3	92.9	2.4
Outside	14.3	11.4	22.2	53.7	1.2	11.1	4.5	7.4	8.6	1.7	0.5	6.0	0.7	7.1	97.6
Stable	3.6	0.5	0.0	0.0	78.3	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0
Superstructure?															
Yes	9.8	1.0	1.5	73.4		10.0	3.3	2.0	28.9	0.0	2.1	0.6	1.6	2.2	0.0
No	90.2	99.0	98.5	26.6		90.0	96.7	98.0	71.1	100.0	97.9	99.4	98.4	97.8	100.0

II.1.16 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Animal Waste Material															
Stable	2.9	25.1	20.3	7.4		Data Not Available					1.5	1.0	0.0	1.1	42.5
Yard	6.6	3.1	22.0	3.2							0.0	1.0	4.7	0.5	1.2
Street	69.1	14.8	53.7	89.4							92.4	88.4	32.4	9.7	13.0
Canal	0.0	0.0	0.0	0.0							0.6	0.0	24.8	45.5	1.0
Roof	0.0	0.0	0.0	0.0							0.0	0.0	2.4	0.7	1.0
None	21.3	57.0	4.1	0.0							5.5	9.6	35.7	42.5	41.4
Stable Cleaning															
Daily	72.5	85.6	7.1	29.9							97.3	93.4	69.0	59.8	73.9
Weekly	24.2	13.8	60.2	36.9							0.9	1.5	12.0	0.0	20.3
Monthly	1.3	0.0	31.0	32.6							0.0	1.4	0.0	0.9	0.0
Never	2.0	0.5	0.9	0.5							1.2	3.6	19.0	38.9	5.6
Weekly and Monthly	0.0	0.0	0.9	0.0							0.0	0.0	0.0	0.5	0.0

II.1.17 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
House Approach															
Non-Earth:															
Clean	5.9	99.1	9.1	25.4		Data Not Available					83.6	0.2	86.0	16.7	17.3
Littered	2.2	0.0	0.0	22.2							5.4	0.0	0.0	0.0	1.5
Dry	91.4	0.0	90.9	51.9							5.3	93.4	3.0	83.3	80.8
Wet	0.0	0.0	0.0	0.5							5.2	5.7	10.3	0.0	0.0
Earth:															
Clean	0.5	0.5	0.0	0.0							0.4	0.0	0.7	0.0	0.0
Littered	0.0	0.5	0.0	0.0							0.0	0.0	0.0	0.0	0.0
Dry	0.0	0.0	0.0	0.0							0.0	0.0	0.0	0.0	0.3
Wet	0.0	0.0	0.0	0.0							0.0	0.7	0.0	0.0	0.0

II.1.18 (continued)

	Village Study Site														
	Aswan					Beni Suef					Kafr El Sheikh				
	1	2	3	4	10	11	12	13	14	15	16	17	18	19	20
Number of Windows															
1	17.8	13.3	0.0	33.3	24.3	29.3	34.4	18.0	46.4	32.7	0.4	28.5	5.1	3.8	15.0
2	17.8	21.7	13.8	35.0	31.9	29.3	23.5	22.6	24.6	25.6	2.6	38.4	18.7	13.1	16.9
3	22.2	17.5	2.8	11.7	21.3	8.4	19.4	24.0	10.9	25.3	5.0	16.9	19.7	12.1	16.3
4	18.9	15.1	30.3	11.7	15.9	14.8	12.6	18.0	5.8	10.5	31.9	6.8	23.5	27.1	14.4
5	8.9	9.6	16.5	1.7	0.3	3.1	5.0	5.8	5.4	4.7	27.5	4.9	7.0	15.9	8.5
6	4.4	12.7	26.6	5.0	2.5	11.0	2.1	6.0	1.7	1.2	9.5	3.5	9.3	10.8	8.3
7	1.1	1.8	0.9	0.0	1.5	0.0	0.0	1.4	1.7	0.0	13.9	0.0	7.0	12.5	3.8
8	1.1	5.4	8.3	0.0	2.3	0.0	0.3	2.1	2.5	0.0	6.2	1.1	3.4	1.3	6.8
9	3.3	0.0	0.0	0.0	0.0	1.3	0.5	0.0	0.8	0.0	1.3	0.0	3.1	1.3	1.1
10	1.1	1.2	0.0	0.0	0.0	1.0	0.0	0.7	0.2	0.0	0.7	0.0	1.3	0.7	5.2
More than 10	3.3	1.8	0.9	1.7	0.0	1.8	0.3	3.2	0.4	0.0	0.1	0.0	1.9	1.4	4.7
Roof Condition															
Permeable	37.5	40.8	73.6	96.8	90.3	39.0	5.8	43.1	82.6	5.2	88.7	97.3	85.2	86.4	82.2
Non-permeable	62.5	59.2	26.4	3.2	9.7	61.0	94.2	56.9	17.4	94.8	11.3	2.7	14.8	13.6	17.8

APPENDIX II.2

Distribution of Environmental and Housing Factors in Egyptian New Nubia, 1977

Percent of Houses with Attributes

	Ballana	Tushka	El Malki	Kurta	Kalabsha	All Nubia
	%	%	%	%	%	%
HOUSE CONSTRUCTION MATERIAL						
1 stone or red brick	94.9	95.5	95.0	100.0	99.5	97.0
2 mud brick	4.6	4.0	3.5	0.0	0.5	2.5
3 wood or reed	0.5	0.0	0.0	0.0	0.0	0.1
4 combinations	0.0	1.5	1.5	0.0	0.0	0.4
Number	197	201	200	200	199	997
FLOOR CONSTRUCTION						
1 earth	41.9	4.5	4.5	0.0	0.5	10.2
2 concrete	56.1	6.0	0.5	39.8	92.5	38.8
3 tile	0.5	0.0	0.5	0.0	5.5	1.2
4 1&2	0.0	85.1	87.5	57.2	0.0	46.2
5 other combinations	1.5	4.5	7.0	3.0	1.5	3.5
Number	198	201	200	201	199	999
LIGHTING						
1 electricity	39.3	39.7	10.6	53.7	57.4	40.1
2 kerosene	60.7	60.3	65.8	46.3	42.1	55.0
3 1&2	0.0	0.0	21.6	0.0	0.0	4.3
4 other	0.0	0.0	1.5	0.0	0.5	0.4
Number	196	199	199	201	197	992
TELEVISION						
present	3.1	1.6	0.6	20.1	6.2	6.6
Number	196	190	179	199	194	958
NUMBER OF ROOMS						
one	7.1	5.6	13.0	2.0	0.0	5.5
two	22.7	13.1	30.0	38.3	33.8	27.6
three	26.8	46.5	18.5	13.9	64.1	33.9
four	32.3	32.8	30.5	25.9	1.5	24.6
five	9.1	1.5	7.0	16.9	0.0	6.9
more than five	2.0	0.5	1.0	3.0	0.5	1.4
Number	198	198	200	201	198	995
NUMBER OF PERSONS LIVING IN HOUSE						
one	8.3	8.0	12.4	43.3	16.8	17.9
two	7.8	13.5	15.5	25.9	20.8	16.8
three	12.4	10.0	15.5	11.4	9.1	11.7
four	13.5	15.0	11.3	7.5	13.2	12.1
five	17.1	16.0	12.9	6.0	10.2	12.4
six	15.0	11.0	10.8	2.5	7.6	9.3
seven	9.3	8.0	9.8	1.0	6.6	6.9
eight	6.7	9.5	4.1	0.5	4.1	5.0
more than eight	9.7	9.0	7.7	1.5	11.6	8.0
Number	193	200	194	201	197	985

II.2.2 (continued)

	Ballana	Tushka	El Malki	Kurta	Kalabsha	All Nubia
	%	%	%	%	%	%
PERSONS PER ROOM						
less than one	15.6	17.6	19.2	69.7	28.5	30.5
one	50.0	46.6	46.6	24.7	34.7	40.5
two	21.4	29.5	20.7	5.1	21.8	19.6
three	8.9	3.1	9.3	0.5	8.3	6.0
four	3.1	0.0	2.6	0.0	6.2	2.4
more than four	1.0	3.2	1.5	0.0	0.5	1.2
Number	192	193	193	198	193	969
COOKING FUEL						
1 gas	2.1	0.5	0.0	55.2	5.5	12.8
2 oil	94.9	1.0	18.5	5.0	94.5	42.4
3 wood	2.6	0.0	0.5	0.0	0.0	0.6
4 dung	0.0	0.5	0.0	3.5	0.0	0.8
5 2&3	0.5	0.5	75.5	0.0	0.0	15.3
6 combinations of dung with any other fuel	0.0	96.0	3.5	34.4	0.0	27.0
7 other	0.0	1.5	2.0	2.0	0.0	1.1
Number	195	201	200	201	199	996
SCREENS						
present	4.1	7.9	1.5	4.5	5.5	4.7
Number	194	191	196	200	199	980
MOSQUITO NETS						
present	1.0	10.4	1.0	0.0	3.6	3.7
Number	192	193	197	71	193	846
OWNERSHIP						
1 own	15.9	1.0	0.5	0.0	1.5	3.7
2 rent	48.7	8.0	4.0	99.5	68.3	45.6
3 no information	35.4	91.0	95.5	0.5	30.2	50.6
Number	195	201	200	201	199	996
LOCATION OF STABLE						
1 inside	94.4	74.9	96.0	92.0	99.0	91.3
2 outside	1.0	10.8	1.5	2.0	0.0	3.0
3 1&2	0.0	11.8	0.0	0.0	0.0	2.3
4 none	4.6	3.6	2.5	6.0	1.0	3.5
Number	195	195	199	201	199	989
STABLE CLEANING						
1 daily	99.0	3.1	98.0	99.0	97.5	79.4
2 weekly	1.0	3.6	1.0	1.0	2.5	1.8
3 monthly	0.0	86.2	1.0	0.0	0.0	17.4
4 never	0.0	7.2	0.0	0.0	0.0	1.4
Number	192	195	196	198	198	979

II.2.3 (continued)

	Ballana	Tushka	El Malki	Kurta	Kalabsha	All Nubia
	%	%	%	%	%	%
ANIMAL WASTE MATERIAL DISPOSAL						
1 stable	1.5	2.5	2.5	0.5	4.6	2.3
2 yard	1.5	0.0	0.5	0.0	1.0	0.6
3 street	96.9	0.0	95.0	10.0	0.0	40.1
4 canal	0.0	0.0	0.0	88.0	0.5	17.9
5 roof	0.0	0.0	0.5	0.0	3.6	0.8
6 none	0.0	97.5	1.5	1.5	90.4	38.2
Number	194	199	199	200	197	989
WATER SOURCE						
1 public	97.3	74.4	98.0	98.9	95.9	92.8
2 private ground well	2.1	25.1	0.0	1.1	4.1	6.6
3 surface	0.5	0.5	2.0	0.0	0.0	0.5
Number	188	199	199	184	197	967

WATER SUPPLY

	N=199	N=199	N=200	N=199	N=200	N=997
DRINKING						
1 piped inside	0.5	4.9	1.0	0.5	1.0	0.7
2 piped outside	93.0	97.5	98.0	88.6	99.5	95.3
3 hand pump inside	0.0	0.0	0.0	0.5	0.0	0.1
4 canal	0.0	97.5	0.0	8.0	0.5	21.4
5 drain	0.0	0.0	0.0	0.5	0.0	0.1
BATHING						
1 piped inside	0.0	0.0	1.0	1.0	0.0	0.4
2 piped outside	92.0	97.5	97.5	88.6	99.5	95.0
3 hand pump inside	0.0	0.0	0.0	0.5	0.0	0.1
4 canal	0.0	97.5	0.0	8.0	0.5	21.4
5 drain	0.0	0.0	0.0	0.5	0.0	0.1
6 lake or pond	0.0	0.0	0.0	0.5	0.0	0.1
LAUNDRY						
1 piped inside	0.0	0.0	0.5	0.5	0.0	0.2
2 piped outside	92.5	97.5	97.5	88.6	99.5	95.1
3 hand pump inside	0.0	0.0	0.0	0.5	0.0	0.1
4 canal	0.0	97.5	0.0	8.0	0.5	21.4
5 drain	0.0	0.0	0.0	0.5	0.0	0.1
6 lake or pond	0.0	0.0	0.0	0.5	0.0	0.1
UTENSILS						
1 piped inside	0.0	0.0	0.5	0.5	0.0	0.2
2 piped outside	92.5	96.5	97.5	88.6	99.0	94.8
3 hand pump inside	0.0	0.0	0.0	0.5	0.0	0.1
4 canal	0.0	97.5	0.0	8.0	0.5	21.4
5 drain	0.0	0.0	0.0	0.5	0.0	0.1
6 lake or pond	0.0	0.0	0.0	0.5	0.0	0.1
ANIMALS						
1 piped inside	0.0	0.0	1.0	1.0	0.5	0.5
2 piped outside	57.8	6.4	97.5	87.6	0.0	49.8
3 hand pump inside	0.0	0.0	0.0	0.5	0.0	0.1
4 canal	0.0	96.1	0.0	8.0	1.5	21.3
5 drain	0.0	0.0	0.0	0.5	99.5	19.9
6 lake or pond	0.0	0.0	0.0	0.5	0.0	0.1

II.2.4 (continued)

	Ballana %	Tushka %	El Malki %	Kurta %	Kalabsha %	All Nubia %
STORAGE OF WATER						
1 metal	0.0	0.0	0.0	0.5	1.5	0.4
2 ceramic	100.0	100.0	98.0	97.5	98.0	98.7
3 combinations and others	0.0	0.0	2.0	2.0	0.5	
Number	192	196	200	197	199	984
WASTEWATER DRAINAGE						
1 concrete	57.6	4.1	12.0	2.1	2.5	15.5
2 pipe	0.0	0.0	0.5	0.5	0.5	0.3
3 tile	37.7	0.0	0.5	0.0	2.0	7.9
4 earth	4.9	95.9	86.9	0.0	0.5	40.0
5 other	0.0	0.0	0.0	97.4	94.4	38.4
Number	191	196	199	194	197	977
LATRINE						
present	97.9	98.0	98.5	99.5	100.0	98.8
Number	190	196	199	196	199	980
LOCATION OF LATRINE						
1 inside	100.0	99.0	98.5	98.0	100.0	99.1
2 outside	0.0	0.5	1.5	2.0	0.0	0.8
3 stable	0.0	0.5	0.0	0.0	0.0	0.1
Number	191	192	194	200	198	975
TYPE OF LATRINE						
1 borehole	2.1	0.0	0.5	1.7	1.0	1.1
2 pit	3.7	2.6	0.5	97.8	99.0	40.5
3 masonary walls	94.1	97.4	99.0	0.6	0.0	58.5
Number	187	192	193	178	199	949
COVER FOR LATRINE						
present	60.2	98.0	98.0	12.5	100.0	74.2
Number	191	196	198	192	199	976
PRESENCE OF WATER CARRIAGE IN LATRINE						
present	0.0	94.8	2.1	0.0	1.0	19.3
Number	189	192	194	200	199	974

APPENDIX II.3, Table I

Prevalence of Parasitosis in Egyptian Nubia, 1977

Parasite	Ballana N=496		Tushka N=669		El Malki N=519		Kurta N=466		Kalabsha N=478		All Nubia N=2628	
	No. Pos	% Pos	No. Pos	% Pos	No. Pos	% Pos	No. Pos	% Pos	No. Pos	% Pos	No. Pos	% Pos
Ascaris lumbricoides	9	1.8	15	2.2	10	1.9	13	2.8	13	2.7	60	2.3
Trichuris trichiura	-	0.0	1	0.1	1	0.2	-	0.0	-	0.0	2	0.1
Enterobius vermicularis	7	1.4	17	2.5	9	1.7	2	0.4	3	0.6	38	1.4
Ancylostoma duodenale	-	0.0	3	0.4	1	0.2	2	0.4	1	0.2	7	0.3
Strongyloides stercoralis	1	0.2	1	0.1	6	1.2	6	1.3	41	8.6	55	2.1
Taenia sp.	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
Trichostrongylus sp.	1	0.2	-	0.0	1	0.2	1	0.2	3	0.6	6	0.2
Hymenolepis nana	25	5.0	57	8.5	34	6.6	18	3.9	11	2.3	145	5.5
H. heterophyes	-	0.0	-	0.0	2	0.4	1	0.2	-	0.0	3	0.1
H. hepatica	-	0.0	-	0.0	-	0.0	2	0.4	-	0.0	2	0.1
F. gigantica	1	0.2	1	0.1	-	0.0	-	0.0	-	0.0	2	0.1
Giardia lamblia	57	11.5	1	0.1	46	8.9	26	5.6	36	7.5	256	9.7
Entamoeba histolytica	31	6.3	46	6.9	41	7.9	39	8.4	41	8.6	198	7.5
Entamoeba coli	262	52.8	311	46.5	223	43.0	196	42.1	284	59.4	1278	48.6
Entamoeba hartmanni	6	1.2	12	1.8	5	1.0	1	0.2	5	1.0	29	1.1
Iodamoeba butschlii	6	1.2	9	1.3	7	1.3	7	1.5	13	2.7	42	1.6
Endolimax nana	1	0.2	2	0.3	-	0.0	-	0.0	1	0.2	4	0.2
Chilomastix mesnili	1	0.2	4	0.6	-	0.0	2	0.4	-	0.0	7	0.3
Trichomonas hominis	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0
Dientamoeba fragilis	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0	-	0.0

APPENDIX II.3, Table II

Age Distribution of Important Parasitic Infections
in Egyptian Nubia, 1977

Parasite	Age Distribution 1 N=31	 1-4 N=241	 5-9 N=283	 10-14 N=271	 15-19 N=270	 20-24 N=142	 25-29 N=130	 30-34 N=112	 35-39 N=119	 40-44 N=112	 45-49 N=112	 50-54 N=96	 55-59 N=105	 60-64 N=69	 65+ N=163	All Ages N=2256
	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos	% Pos
Ascaris lumbricoides	0.0	1.2	2.5	3.7	2.2	0.7	0.8	3.6	0.8	0.0	2.7	7.3	1.0	1.4	1.8	1.9
Trichuris trichiura	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.1
Enterobius vermicularis	6.5	0.4	1.4	3.7	2.6	0.7	0.8	0.9	0.8	0.0	3.6	2.1	1.9	0.0	0.6	1.6
Ancylostoma duodenale	0.0	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Hymenolepis nana	3.2	12.5	9.5	8.5	4.4	4.2	1.5	3.6	3.4	4.5	3.6	3.1	1.9	4.3	1.8	5.7
Giardia lamblia	12.9	20.8	17.0	10,0	9.6	9.2	4.6	8.0	7.6	8.9	8.0	5.2	3.8	8.7	5.5	10.4
Entamoeba histolytica	0.0	4.2	5.7	7.7	10.0	3.5	9.2	7.1	16.8	4.5	8.0	5.2	5.7	5.8	7.4	7.1
Escherichia coli	12.9	42.3	50.9	55.7	49.6	49.3	48.5	54.5	47.1	38.4	50.0	44.8	56.2	47.8	50.3	48.8

Note: No cases of Taenia sp. infection were observed in the sampled population.

APPENDIX II.3, Table III

Sex Distribution of Important Parasitic Infections in Egyptian Nubia, 1977

Parasite	Males N=940		Females N=1328		Total N=2268	
	No. Pos	% Pos	No. Pos	% Pos	No. Pos	% Pos
Ascaris lumbricoides	24	2.6	26	2.0	50	2.2
Trichuris trichiura	1	0.1	1	0.1	2	0.1
Enterobius vermicularis	19	2.0	18	1.4	37	1.6
Ancylostoma duodenale	1	0.1	3	0.2	4	0.2
Hymenolepis nana	63	6.7	66	5.0	129	5.7
Giardia lamblia	113	12.0	122	9.2	235	10.4
Entamoeba histolytica	60	6.4	101	7.6	161	7.1
Entamoeba coli	432	46.0	674	50.8	1106	48.8

Note: No cases of Taenia sp. infection were observed in the sampled population.

APPENDIX II.3, Table IV

A Comparison of the
Prevalence of Intestinal Helminthic and Protozoal Infestations (Per 100 Persons)
by Age and Sex; Nubia, Egypt, 1963 and 1977.

AGE (Years)	Hymenolepis nana		Ascaris lumbricoides		Enterobius vermicularis		E. coli		Entamoeba histolytica		Giardia lamblia	
	1963	1977	1963	1977	1963	1977	1963	1977	1963	1977	1963	1977
Less than 5												
Males	9.4	13.73	9.4	0.84	3.1	0.0	9.4	30.62	0.0	4.67	0.0	14.26
Females	17.4	5.56	0.0	4.08	0.0	0.64	21.7	30.67	0.0	4.54	17.4	11.57
Total	12.7	10.69	5.4	2.03	1.8	0.36	14.6	31.02	0.0	2.35	7.3	12.23
5 - 14												
Males	22.5	9.32	12.6	4.29	0.0	3.43	31.5	49.12	0.9	3.85	2.7	13.83
Females	16.8	8.95	10.6	2.09	1.8	0.52	38.9	58.31	0.9	8.86	3.5	15.35
Total	19.6	9.12	11.6	3.35	0.9	2.38	35.3	53.79	0.9	6.16	3.1	14.52
15 - 44												
Males	1.6	3.15	7.9	1.35	6.4	1.73	31.7	42.62	1.6	9.28	1.6	7.95
Females	2.7	2.96	5.8	1.34	0.4	0.64	43.6	44.59	3.1	6.93	1.8	8.53
Total	2.4	3.28	6.2	1.52	1.7	1.18	41.0	43.55	2.8	7.79	1.7	8.10
45 +												
Males	0.0	1.67	3.8	0.0	0.0	0.19	35.8	59.28	11.3	4.71	3.8	5.88
Females	1.2	2.72	1.3	0.63	0.0	0.66	27.0	45.12	5.7	4.44	1.9	3.69
Total	0.9	1.76	1.9	0.63	0.0	0.70	29.2	47.53	7.1	5.39	2.4	4.75
All ages												
Males	11.2	6.50	9.3	1.94	1.9	1.74	29.7	46.40	3.1	5.82	2.3	10.41
Females	6.0	4.59	5.2	1.63	0.6	0.62	36.5	46.35	3.3	5.92	2.9	9.14
Total	7.7	5.46	6.6	1.86	1.0	1.28	34.3	45.66	3.2	6.04	2.7	9.55

Appendix III.1 Table I

Kafr El Sheikh: Percent Prevalence of Selected Parasites by Latrine

Parasite	Latrine Present	 Absent	Total
Ascaris lumbricoides			
Positive			
Number	245	42	287
Percent	8.0	12.0	8.5
Negative			
Number	2800	309	3109
Percent	92.0	88.0	91.5
N = 3396 DF = 1	Chi-Square Significance = 0.0124, Statistic = 6.2502		
Ancylostoma duodenale			
Positive			
Number	43	4	47
Percent	1.4	1.1	1.4
Negative			
Number	3002	347	3349
Percent	98.6	98.9	98.6
N = 3396 DF = 1	Chi-Square Significance = 0.6790, Statistic =0.17129		
Hymenolepis nana			
Positive			
Number	74	4	78
Percent	2.4	1.1	2.3
Negative			
Number	2971	347	3318
Percent	97.6	98.9	97.9
N = 3396 DF = 1	Chi-Square Significance = 0.1264, Statistic = 2.3361		
Giardia lamblia			
Positive			
Number	197	18	215
Percent	6.5	5.1	6.3
Negative			
Number	2848	333	3181
Percent	93.5	94.9	93.7
N = 3396 DF = 1	Chi-Square Significance = 0.3285, Statistic= 0.95497		

III.1 **Table I (continued)**

	Latrine		
Parasite	Present	Absent	Total
Entameoba histolytica			
Positive			
Number	136	13	149
Percent	4.5	3.7	4.4
Negative			
Number	2909	338	3247
Percent	95.5	96.3	95.6
N = 3396 DF = 1	Chi-Square Significance = 0.5089, Statistic = 0.43634		
Entameoba coli			
Positive			
Number	1232	116	1348
Percent	40.5	33.0	39.7
Negative			
Number	1813	235	2048
Percent	59.5	67.0	60.3
N = 3396 DF = 1	Chi-Square Significance = 0.0072, Statistic = 7.2216		

Appendix III.1 Table II

Kafr El Sheikh: Percent Prevalence of Selected Parasites by Sex

Parasite	Sex Male	 Female	 Total
Ascaris lumbricoides			
Positive			
Number	145	162	307
Percent	7.9	8.9	8.4
Negative			
Number	1684	1649	3333
Percent	92.1	91.1	91.6
N = 3640 DF = 1 Chi-Square Significance = 0.2694, Statistic = 1.2199			
Ancylostoma duodenale			
Positive			
Number	26	30	56
Percent	1.4	1.7	1.5
Negative			
Number	1803	1781	3584
Percent	98.6	98.3	98.5
N = 3640 DF = 1 Chi-Square Significance = 0.5646, Statistic = 0.3316			
Hymenolepis nana			
Positive			
Number	121	105	226
Percent	6.6	5.8	6.2
Negative			
Number	1708	1706	3414
Percent	93.4	94.2	93.8
N = 3640 DF = 1 Chi-Square Significance = 0.3067, Statistic = 1.0449			
Entameoba histolytica			
Positive			
Number	91	72	163
Percent	5.0	4.0	4.5
Negative			
Number	1738	1739	3477
Percent	95.0	96.0	95.5
N = 3640 DF = 1 Chi-Square Significance = 0.1448, Statistic = 2.1261			
Entameoba coli			
Positive			
Number	718	708	1426
Percent	39.3	39.1	39.2
Negative			
Number	1111	1103	2214
Percent	60.7	60.9	60.8
N = 3640 DF = 1 Chi-Square Significance = 0.9203, Statistic =0.10022-1			

Appendix III.1 Table III

Kafr El Sheikh: Percent Prevalence of Selected Parasites by Age Groups

Parasite	0 to 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 or >
Ascaris lumbricoides															
Positive															
Number	2	33	43	55	30	15	24	10	24	21	18	7	8	11	3
Percent	6.1	9.0	8.3	10.3	7.2	6.6	8.6	5.6	8.6	10.7	7.7	5.7	7.0	11.3	4.3
Negative															
Number	31	332	476	479	385	212	255	170	225	176	215	115	106	86	67
Percent	93.9	91.0	91.7	89.7	92.8	93.4	91.4	94.4	90.4	89.3	92.3	94.3	93.0	88.7	95.7
N = 3634 DF = 14	Chi-Square Significance = 0.5616, Statistic = 12.558														
Ancylostoma duodenale															
Positive															
Number	0	1	8	15	6	3	5	2	2	3	2	4	0	2	3
Percent		0.3	1.5	2.8	1.4	1.3	1.8	1.1	0.8	1.5	0.9	3.3		2.1	4.3
Negative															
Number	33	364	511	519	409	224	274	247	247	194	231	118	114	95	67
Percent	100	99.7	98.5	97.2	98.6	98.7	98.2	98.9	99.2	98.5	99.1	96.7	100	97.9	95.7
N = 3634 DF = 14	Chi-Square Significance = 0.1321, Statistic = 19.940														
Hymenolepis nana															
Positive															
Number	2	11	20	11	5	4	8	5	4	2	6	2	2	0	2
Percent	6.1	3.0	3.9	2.1	1.2	1.8	2.9	2.8	1.6	1.0	2.6	1.6	1.8		2.9
Negative															
Number	31	354	499	523	410	223	271	175	245	195	227	120	112	97	68
Percent	93.9	97.0	96.1	97.9	98.8	98.2	97.1	97.2	98.4	99.0	97.4	98.4	98.2	100	97.1
N = 3634 DF = 14	Chi-Square Significance = 0.2867, Statistic = 16.450														

III.1 Table III (continued)

Parasite	0 to 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 or >
Giardia lamblia															
Positive															
Number	1	32	43	33	24	12	12	12	13	15	13	5	5	4	1
Percent	3.0	8.8	8.3	6.2	5.8	5.3	4.3	6.7	5.2	7.6	5.6	4.1	4.4	4.1	1.4
Negative															
Number	32	333	476	501	391	215	267	168	236	182	220	117	109	93	69
Percent	97.0	91.2	91.7	93.8	94.2	94.7	95.7	93.3	94.8	92.4	94.4	95.9	95.6	95.9	98.6
N = 3634 DF = 14	Chi-Square Significance = 0.2494, Statistic = 17.129														
Entameoba histolytica															
Positive															
Number	1	6	18	34	23	11	12	3	9	9	9	11	7	8	2
Percent	3.0	1.6	3.5	6.4	5.5	4.8	4.3	1.7	3.6	4.6	3.9	9.0	6.1	8.2	2.9
Negative															
Number	32	359	501	500	392	216	267	177	240	188	224	111	107	89	68
Percent	97.0	98.4	96.5	93.6	94.5	95.2	95.7	98.3	96.4	95.4	96.1	91.0	93.9	91.8	97.1
N = 3634 DF = 14	Chi-Square Significance = 0.0139, Statistic = 28.087														
Entameoba coli															
Positive															
Number	10	107	224	219	155	81	110	76	113	74	108	38	44	37	28
Percent	30.3	29.3	43.2	41.0	37.3	35.7	39.4	42.2	45.4	37.6	46.4	31.1	38.6	38.1	40.0
Negative															
Number	23	258	295	315	260	146	169	104	136	123	125	84	70	60	42
Percent	69.7	70.7	56.8	59.0	62.7	64.3	60.6	57.8	54.6	62.4	53.6	68.9	61.4	61.9	60.0
N = 3634 DF = 14	Chi-Square Significance = 0.0013, Statistic = 35.299														

Appendix III.1 Table IV

Kafr El Sheikh: Percent Prevalence of all Indentified Parasites by Study Site

Parasite	Study Site Code 16	17	18	19	20	Total
Ascaris lumbricoides						
Number positive	40	34	122	37	74	307
Percent positive	4.8	4.1	19.1	7.3	8.9	8.4
Chi-Square signif.	0.0					
Trichuris trichiura						
Number positive	0	2	1	2	4	9
Percent positive		0.2	0.2	0.4	0.5	0.2
Chi-Square signif.	0.3322					
Enterobius vermicularis						
Number positive	4	13	6	4	21	48
Percent positive	0.5	1.6	0.9	0.8	2.5	1.3
Chi-Square signif.	0.0029					
Ancylostoma duodenale						
Number positive	6	12	5	9	24	56
Percent positive	0.7	1.5	0.8	1.8	2.9	1.5
Chi-Square signif.	0.0026					
Strongyloides stercoralis						
Number positive	2	1	2	2	1	8
Percent positive	0.2	0.1	0.3	0.4	0.1	0.2
Chi-Square signif.	0.7882					
Ta sp.						
Number positive	0	1	1	0	1	3
Percent positive		0.1	0.2		0.1	0.1
Chi-Square signif.	0.7663					
Trichostrongylus sp.						
Number positive	5	19	5	5	7	41
Percent positive	0.6	2.3	0.8	1.0	0.8	1.1
Chi-Square signif.	0.0076					

III.1 Table IV (continued)

Parasite	Study Site Code 16	17	18	19	20	Total
Hymenolepis nana						
Number positive	15	21	8	18	23	85
Percent positive	1.8	2.6	1.3	3.6	2.8	2.3
Chi-Square signif.	0.0721					
Heterophyes heterophyes						
Number positive	1	4	6	0	3	14
Percent positive	0.1	0.5			0.4	0.4
Chi-Square signif.	0.0648					
Fasciola hepatica						
Number positive	0	3	3	1	2	9
Percent positive		0.4	0.5	0.2	0.2	0.2
Chi-Square signif.	0.4229					
Fasciola gigantica						
Number positive	2	3	3	0	3	11
Percent positive	0.2	0.4	0.5		0.4	0.3
Chi-Square signif.	0.6550					
Giardia lamblia						
Number positive	101	38	16	32	39	226
Percent positive	12.0	4.6	2.5	6.3	4.7	6.2
Chi-Square signif.	0.0000					
Entameoba histolytica						
Number positive	47	50	24	18	24	163
Percent positive	5.6	6.1	3.8	3.6	2.9	4.5
Chi-Square signif.	0.0069					
Entameoba coli						
Number positive	389	316	178	165	379	1427
Percent positive	46.2	38.4	27.8	32.6	45.5	39.2
Chi-Square signif.	0.0000					

III.1 Table IV (continued)

Parasite	Study Site Code 16	17	18	19	20	Total
Entameoba hartmanni						
Number positive	10	19	6	3	1	39
Percent positive	1.2	2.3	0.9	0.6	0.1	1.1
Chi-Square signif.	0.0004					
Iodamoeba butschlii						
Number positive	7	11	2	3	8	31
Percent positive	0.8	1.3	0.3	0.6	1.0	0.9
Chi-Square signif.	0.2838					
Endolimax nana						
Number positive	1	2	2	0	3	8
Percent positive	0.1	0.2	0.3		0.4	0.2
Chi-Square signif.	0.6396					
Chilomastix mesnili						
Number positive	1	4	1	1	0	7
Percent positve	0.1	0.5	0.2	0.2		0.2
Chi-Square signif.	0.2310					

Appendix III.1 Table V

Kafr El Sheikh. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Drinking Water

Parasite	Yes	No	Total
Ascaris lumbricoides			
Positive			
Number	1	42	43
Percent	7.1	12.2	12.0
Negative			
Number	301	13	314
Percent	87.8	92.9	88.0
N = 357 DF = 1	Chi-Square Significance = 0.5654, Statistic = 0.33051		
Ancylostoma duodenale			
Positive			
Number	6	0	6
Percent	1.7		1.7
Negative			
Number	337	14	351
Percent	98.3	100	98.3
N = 357 DF = 1	Chi-Square Significance = 0.6177, Statistic = 0.24908		
Giardia lamblia			
Positive			
Number	18	0	18
Percent	5.2		5.0
Negative			
Number	325	14	339
Percent	94.8	100	95.0
N = 357 DF = 1	Chi-Square Significance = 0.3791, Statistic = 0.77370		
Entameoba histolytica			
Positive			
Number	9	1	10
Percent	2.6	7.1	2.8
Negative			
Number	334	13	347
Percent	97.4	92.9	97.2
N = 357 DF = 1	Chi-Square Significance = 0.3152, Statistic = 1.0089		
Entameoba coli			
Positive			
Number	110	6	116
Percent	32.1	42.9	32.5
Negative			
Number	233	8	241
Percent	67.9	57.1	67.5
N = 357 DF = 1	Chi-Square Significance = 0.3983, Statistic = 0.71356		

Appendix III.1 Table VI

Kafr El Sheikh. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Bathing Water

Parasite	Yes	No	Total
Ascaris lumbricoides			
Positive			
Number	42	1	43
Percent	12.2	7.1	12.0
Negative			
Number	301	13	314
Percent	87.8	92.9	88.0
N = 357 DF = 1 Chi-Square Significance = 0.5654, Statistic = 0.33051			
Ancylostoma duodenale			
Positive			
Number	6	0	6
Percent	1.7		1.7
Negative			
Number	337	14	351
Percent	98.3	100	98.3
N = 357 DF = 1 Chi-Square Significance = 0.6177, Statistic = 0.24908			
Giardia lamblia			
Positive			
Number	18	0	18
Percent	5.2		5.0
Negative			
Number	325	14	339
Percent	94.8	100	95.0
N = 357 DF = 1 Chi-Square Significance = 0.3791, Statistic = 0.77370			
Entameoba histolytica			
Positive			
Number	9	1	10
Percent	2.6	7.1	2.8
Negative			
Number	334	13	347
Percent	97.4	92.9	97.2
N = 357 DF = 1 Chi-Square Significance = 0.3152, Statistic = 1.0089			
Entameoba coli			
Positive			
Number	110	6	116
Percent	32.1	42.9	32.5
Negative			
Number	233	8	241
Percent	67.9	57.1	67.5
N = 357 DF = 1 Chi-Square Significance = 0.3983, Statistic = 0.71356			

Appendix III.1 Table VII

Kafr El Sheikh. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Laundry Water

Parasite	Yes	No	Total
Ascaris lumbricoides			
Positive			
Number	42	1	43
Percent	12.0	7.1	12.0
Negative			
Number	301	13	314
Percent	87.8	92.9	88.0
N = 357 DF = 1 Chi-Square Significance = 0.5654, Statistic = 0.33051			
Ancylostoma duodenale			
Positive			
Number	6	0	6
Percent	1.7		1.7
Negative			
Number	337	14	351
Percent	98.3	100	98.3
N = 357 DF = 1 Chi-Square Significance = 0.6177, Statistic = 0.24908			
Giardia lamblia			
Positive			
Number	18	0	18
Percent	5.2		5.0
Negative			
Number	325	14	339
Percent	94.8	100	95.0
N = 357 DF = 1 Chi-Square Significance = 0.3791, Statistic = 0.77370			
Entameoba histolytica			
Positive			
Number	9	1	10
Percent	2.6	7.1	2.8
Negative			
Number	334	13	347
Percent	97.4	92.9	97.2
N = 357 DF = 1 Chi-Square Significance = 0.3152, Statistic = 1.0089			
Entameoba coli			
Positive			
Number	110	6	116
Percent	32.1	42.9	32.5
Negative			
Number	233	8	241
Percent	67.9	57.1	67.5
N = 357 DF = 1 Chi-Square Significance = 0.3983, Statistic = 0.71356			

Appendix III.1 Table VIII

Kafr El Sheikh. Percent Prevalance of Selected Parasites by Type of of Water Supply: Piped-in Utensil Water

Parasite	Yes	No	Total
Ascaris lumbricoides			
Positive			
Number	42	1	43
Percent	12.2	7.1	12.0
Negative			
Number	301	13	314
Percent	87.8	92.9	88.0
N = 357 DF = 1 Chi-Square Significance = 0.5654, Statistic = 0.33051			
Ancylostoma duodenale			
Positive			
Number	6	0	6
Percent	1.7		1.7
Negative			
Number	337	14	351
Percent	98.3	100	98.3
N = 357 DF = 1 Chi-Square Significance = 0.6177, Statistic = 0.24908			
Giardia lamblia			
Positive			
Number	18	0	18
Percent	5.2		5.0
Negative			
Number	325	14	339
Percent	94.8	100	95.0
N = 357 DF = 1 Chi-Square Significance = 0.3791, Statistic = 0.77370			
Entameoba histolytica			
Positive			
Number	9	1	10
Percent	2.6	7.1	2.8
Negative			
Number	334	13	347
Percent	97.4	92.9	97.2
N = 357 DF = 1 Chi-Square Significance = 0.3152, Statistic = 0.0089			
Entameoba coli			
Positive			
Number	110	6	116
Percent	32.1	42.9	32.5
Negative			
Number	233	8	241
Percent	67.9	57.1	67.5
N = 357 DF = 1 Chi-Square Significance = 0.3983, Statistic = 0.71356			

Appendix III.1 Table IX

Kafr El Sheikh. Percent Prevalence of Selected Parasites by Type of Water Supply: Drinking Water Piped Outside

Parasite	Yes	No	Total
Ascaris lumbricoides			
Positive			
Number	13	30	43
Percent	13.7	11.5	12.0
Negative			
Number	82	232	314
Percent	86.3	88.5	88.0
N = 357 DF = 1 Chi-Square Significance = 0.5666, Statistic = 0.32839			
Ancylostoma duodenale			
Positive			
Number	4	2	6
Percent	4.2	0.8	1.7
Negative			
Number	91	260	351
Percent	95.8	99.2	98.3
N = 357 DF = 1 Chi-Square Significance = 0.0251, Statistic = 5.0137			
Giardia lamblia			
Positive			
Number	4	14	18
Percent	4.2	5.3	5.0
Negative			
Number	91	248	339
Percent	95.8	94.7	95.0
N = 357 DF = 1 Chi-Square Significance = 0.6655, Statistic = 0.18693			
Entameoba histolytica			
Positive			
Number	4	6	10
Percent	4.2	2.3	2.8
Negative			
Number	91	256	347
Percent	95.8	97.7	97.2
N = 357 DF = 1 Chi-Square Significance = 0.3311, Statistic = 0.94443			
Entameoba coli			
Positive			
Number	32	84	116
Percent	33.7	32.1	32.5
Negative			
Number	63	178	241
Percent	66.3	67.9	67.5
N = 357 DF = 1 Chi-Square Significance = 0.7723, Statistic = 0.83740 -1			

Appendix III.1 Table X

Kafr El Sheikh. Percent Prevalence of Selected Parasites by Type of Water Supply: Bathing Water Piped Outside

Parasite	Yes	No	Total
Ascaris lumbricoides			
Positive			
Number	15	28	43
Percent	14.0	11.2	12.0
Negative			
Number	92	222	314
Percent	86.0	88.8	88.0
N = 357 DF = 1 Chi-Square Significance = 0.4535, Statistic = 0.56194			
Ancylostoma duodenale			
Positive			
Number	5	1	6
Percent	4.7	0.4	1.7
Negative			
Number	102	249	351
Percent	95.3	99.6	98.3
N = 357 DF = 1 Chi-Square Significance = 0.0040, Statistic = 8.2790			
Giardia lamblia			
Positive			
Number	4	14	18
Percent	3.7	5.6	5.0
Negative			
Number	103	236	339
Percent	96.3	94.4	95.0
N = 357 DF = 1 Chi-Square Significance = 0.4614, Statistic = 0.54241			
Entameoba histolytica			
Positive			
Number	4	6	10
Percent	3.7	2.4	2.8
Negative			
Number	103	244	347
Percent	96.3	97.6	97.2
N = 357 DF = 1 Chi-Square Significance = 0.4826, Statistic = 0.49293			
Entameoba coli			
Positive			
Number	36	80	116
Percent	33.6	32.0	32.5
Negative			
Number	71	170	241
Percent	66.4	68.0	67.5
N = 357 DF = 1 Chi-Square Significance = 0.7611, Statistic = 0.92422 -1			

Appendix III.1 Table XI

Kafr El Sheikh. Percent Prevalence of Selected Parasites by Type of Water Supply: Laundry Water Piped Outside

Parasite	Yes	No	Total
Ascaris lumbricoides			
Positive			
Number	15	28	43
Percent	12.3	11.9	12.0
Negative			
Number	107	207	314
Percent	87.7	88.1	88.0

N = 357 DF = 1 Chi-Square Significance = 0.9166, Statistic = 0.10957 -1

Parasite	Yes	No	Total
Ancylostoma duodenale			
Positive			
Number	5	1	6
Percent	4.1	0.4	1.7
Negative			
Number	117	234	351
Percent	95.9	99.6	98.3

N = 357 DF = 1 Chi-Square Significance = 0.0105, Statistic = 6.5560

Parasite	Yes	No	Total
Giardia lamblia			
Positive			
Number	7	11	18
Percent	5.7	4.7	5.0
Negative			
Number	115	224	339
Percent	94.3	95.3	95.0

N = 357 DF = 1 Chi-Square Significance = 0.6651, Statistic = 0.18735

Parasite	Yes	No	Total
Entameoba histolytica			
Positive			
Number	4	6	10
Percent	3.3	2.6	2.8
Negative			
Number	118	229	347
Percent	96.7	97.4	97.2

N = 357 DF = 1 Chi-Square Significance = 0.6936, Statistic = 0.15525

Parasite	Yes	No	Total
Entameoba coli			
Positive			
Number	43	73	116
Percent	35.2	31.1	32.5
Negative			
Number	79	162	241
Percent	64.8	68.9	67.5

N = 357 DF = 1 Chi-Square Significance = 0.4236, Statistic = 0.64033

Appendix III.1 Table XII

Kafr El Sheikh. Percent Prevalence of Selected Parasites by Type of Water Supply: Utensil Water Piped Outside

Parasite	Yes	No	Total
Ascaris lumbricoides			
Positive			
Number	16	27	43
Percent	12.9	11.6	12.0
Negative			
Number	108	206	314
Percent	87.1	88.4	88.0
N = 357 DF = 1 Chi-Square Significance = 0.7162, Statistic = 0.13215			
Ancylostoma duodenale			
Positive			
Number	5	1	6
Percent	4.0	0.4	1.7
Negative			
Number	119	232	351
Percent	96.0	99.6	98.3
N = 357 DF = 1 Chi-Square Significance = 0.0117, Statistic = 6.3582			
Giardia lamblia			
Positive			
Number	7	11	18
Percent	5.6	4.7	5.0
Negative			
Number	117	222	339
Percent	94.4	95.3	95.0
N = 357 DF = 1 Chi-Square Significance = 0.7040, Statistic = 0.14436			
Entameoba histolytica			
Positive			
Number	4	6	10
Percent	3.2	2.6	2.8
Negative			
Number	120	227	347
Percent	96.8	97.4	97.2
N = 357 DF = 1 Chi-Square Significance = 0.7228, Statistic = 0.12586			
Entameoba coli			
Positive			
Number	44	72	116
Percent	35.5	30.9	32.5
Negative			
Number	80	161	241
Percent	64.5	69.1	67.5
N = 357 DF = 1 Chi-Square Significance = 0.3252, Statistic = 0.96808			

Appendix III.2 Table I

Beni Suef: Percent Prevalence of Selected Parasites by Latrine

Parasite	Latrine Present	Latrine Absent	Total
Ascaris lumbricoides			
Positive			
Number	917	1501	2418
Percent	99.3	96.8	97.8
Negative			
Number	6	49	55
Percent	0.7	3.2	2.2
N = 2473 DF = 1 Chi-Square Significance = 0.00, Statistic = 16.777			
Ancylostoma duodenale			
Positive			
Number	886	1509	2395
Percent	96.0	97.4	96.8
Negative			
Number	37	41	78
Percent	4.0	2.6	3.2
N = 2473 DF = 1 Chi-Square Significance = 0.0606, Statistic = 3.5210			
Hymenolepis nana			
Positive			
Number	914	1531	2445
Percent	99.0	98.8	98.9
Negative			
Number	9	19	28
Percent	1.0	1.2	1.1
N = 2473 DF = 1 Chi-Square Significance = 0.5687, Statistic = 0.32488			
Giardia lamblia			
Positive			
Number	891	1498	2389
Percent	96.5	96.6	96.6
Negative			
Number	32	52	84
Percent	3.5	3.4	3.4
N = 2473 DF = 1 Chi-Square Significance = 0.8817, Statistic = 0.22162-1			
Entamoeba histolytica			
Positive			
Number	868	1467	2335
Percent	94.0	94.6	94.4
Negative			
Number	55	83	138
Percent	6.0	5.4	5.6
N = 2473 DF = 1 Chi-Square Significance = 0.5268, Statistic = 0.40055			

III.2 Table I (continued)

Parasite	Latrine Present	Latrine Absent	Total
Entamoeba coli			
Positive			
Number	559	784	1343
Percent	60.6	50.6	54.3
Negative			
Number	364	766	1130
Percent	39.4	49.4	45.7

N = 2473 DF = 1 Chi-Square Significance = 0.00, Statistic = 23.233

Appendix III.2 Table II

Beni Suef: Percent Prevalence of Selected Parasites by Sex

Parasite	Male	Female	Total
Ascaris lumbricoides			
Positive			
Number	24	35	59
Percent	1.6	2.5	2.1
Negative			
Number	1435	1360	2795
Percent	98.4	97.5	97.9

N = 2854 DF = 1 Chi-Square Significance = 0.1049, Statistic = 2.6295

Parasite	Male	Female	Total
Ancylostoma duodenale			
Positive			
Number	58	35	93
Percent	4.0	2.5	3.3
Negative			
Number	1401	1360	2761
Percent	96.0	97.5	96.7

N = 2854 DF = 1 Chi-Square Significance = 0.0274, Statistic = 4.8643

Parasite	Male	Female	Total
Hymenolepis nana			
Positive			
Number	18	11	29
Percent	1.2	0.8	1.0
Negative			
Number	1441	1384	2825
Percent	98.8	99.2	99.0

N = 2854 DF = 1 Chi-Square Significance = 0.2358, Statistic = 1.4053

III.2 Table II (continued)

Parasite	Male	Female	Total
Giardia lamblia			
Positive			
Number	53	47	100
Percent	3.6	3.4	3.5
Negative			
Number	1406	1348	2754
Percent	96.4	96.6	96.5
N = 2854 DF = 1 Chi-Square Significance = 0.7020, Statistic = 0.14639			
Entameoba histolytica			
Positive			
Number	87	78	165
Percent	6.0	5.6	5.8
Negative			
Number	1372	1317	2689
Percent	94.2	94.0	94.4
N = 2854 DF = 1 Chi-Square Significance = 0.6707, Statistic = 0.18077			
Entameoba coli			
Positive			
Number	641	637	1278
Percent	43.9	45.7	44.8
Negative			
Number	818	758	1576
Percent	56.1	54.3	55.2
N = 2854 DF = 1 Chi-Square Significance = 0.3532, Statistic = 0.86204			

Appendix III.2 Table III

Beni Suef: Percent Prevalence of Selected Parasites by Age Groups

Parasite	0 to 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 60	61 to 64	65 or >
Ascaris lumbricoides															
Positive															
Number	0	2	10	13	9	2	3	3	3	3	2	2	3	2	1
Percent		0.9	2.2	3.2	3.2	1.3	1.6	1.7	1.6	1.7	1.6	1.1	4.1	2.1	1.1
Negative															
Number	31	229	450	395	269	154	180	176	179	172	126	148	70	93	94
Percent	100	99.1	97.8	96.8	96.8	98.7	98.4	98.3	98.4	98.3	98.4	98.7	95.9	97.9	98.9
N = 2824 DF = 14	Chi-Square Significance = 0.7336, Statistic = 10.384														
Ancylostoma duodenale															
Positive															
Number	0	4	22	16	9	5	5	6	3	8	2	4	3	3	3
Percent		1.7	4.8	3.9	3.2	3.2	2.7	3.4	1.6	4.6	1.6	2.7	4.1	3.2	3.2
Negative															
Number	31	227	438	392	269	151	178	173	179	167	126	146	70	92	92
Percent	100	98.3	95.2	96.1	96.8	96.8	97.3	96.6	98.4	95.4	98.4	97.1	95.9	96.8	96.8
N = 2824 DF = 14	Chi-Square Significance = 0.7079, Statistic = 10.720														
Hymenolepis nana															
Positive															
Number	0	4	15	4	0	0	0	1	1	1	1	1	0	1	0
Percent		1.7	3.3	1.0				0.6	0.5	0.6	0.8	0.7		1.1	
Negative															
Number	31	227	445	404	278	156	183	178	181	174	127	149	73	94	95
Percent	100	98.3	96.7	99.0	100	100	100	99.4	99.5	99.4	99.2	99.3	100	98.9	100
N = 2824 DF = 14	Chi-Square Significance = 0.0024, Statistic = 33.611														

III.2 Table III (continued)

Parasite	0 to 1	1 to 4	5 to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 or >
Entamoeba histolytica															
Positive															
Number	2	13	20	27	18	13	12	7	6	16	11	7	3	4	5
Percent	6.5	5.6	4.3	6.6	6.5	8.3	6.6	3.9	3.3	9.1	8.6	4.7	4.1	4.2	5.3
Negative															
Number	29	218	440	381	260	143	171	172	176	159	117	143	70	91	90
Percent	93.5	94.4	95.7	93.4	93.5	91.7	93.4	96.1	96.7	90.9	91.4	95.3	95.9	95.8	94.7
N = 2824 DF = 14	Chi-Square Significance = 0.4176, Statistic = 14.439														
Giardia lamblia															
Positive															
Number	0	12	30	15	9	6	5	2	6	6	2	1	1	2	3
Percent		5.2	6.5	3.7	3.2	3.8	2.7	1.1	3.3	3.4	1.6	0.7	1.4	2.1	3.2
Negative															
Number	31	219	430	393	269	150	178	177	176	169	126	149	72	93	92
Percent	100	94.8	93.5	96.3	96.8	96.2	97.3	98.9	96.7	96.6	98.4	99.3	98.6	97.9	96.8
N = 2824 DF = 14	Chi-Square Significance = 0.0319, Statistic = 25.276														
Entamoeba coli															
Positive															
Number	7	87	185	205	112	69	90	76	83	89	63	77	36	34	48
Percent	22.6	37.7	40.2	50.2	40.3	44.2	49.2	42.5	45.6	50.9	49.2	51.3	49.3	35.8	50.3
Negative															
Number	24	144	275	203	166	87	93	103	99	86	65	73	31	61	47
Percent	77.4	62.3	59.8	49.8	59.7	55.8	50.8	57.5	54.4	49.1	50.8	48.7	50.7	64.2	49.5
N = 2824 DF = 14	Chi-Square Significance = 0.0014, Statistic = 35.093														

Appendix III.2 Table IV

Beni Suef: Percent Prevalence of all Identified Parasites by Study Site

Parasite	STUDY SITE CODE 11	 12	 13	 14	 15	 Total
Ascaris lumbricoides						
Number positive	4	6	25	22	2	59
Percent positive	1.3	1.0	3.6	3.7	0.3	2.1
Chi-Square signif.	0.0000					
Trichuris trichiura						
Number positive	0	5	0	0	0	5
Percent positive		0.8				0.2
Chi-Square signif.	0.0014					
Enterobius vermicularis						
Number positive	9	31	9	8	3	60
Percent positive	3.9	4.9	1.3	1.3	0.5	2.1
Chi-Square signif.	0.0000					
Ancylostoma duodenale						
Number positive	1	26	2	30	34	93
Percent positive	0.3	4.1	0.3	5.0	5.3	3.3
Chi-Square signif.	0.0000					
Stronglyoides stercoralis						
Number positive	0	4	0	2	1	7
Percent positive		0.6		0.3	0.2	0.2
Chi-Square signif.	0.1506					
Taenia sp.						
Number positive	0	0	0	0	1	1
Percent positive					0.2	0.0
Chi-Square signif.	0.4877					
Trichostrongylus sp.						
Number positive	0	4	3	3	4	14
Percent positive		0.6	0.4	0.5	0.6	0.5
Chi-Square signif.	0.7336					

III.2 Table IV (continued)

Parasite	STUDY SITE CODE 11	12	13	14	15	Total
Hymenolepis nana						
Number positive	3	9	9	6	2	29
Percent positive	1.0	1.4	1.3	1.0	0.3	1.0
Chi-Square signif.	0.3029					
Heterophyes heterophyes						
Number positive	12	2	3	3	4	24
Percent positive	4.0	0.3	0.4	0.5	0.6	0.8
Chi-Square signif.	0.0000					
Fasciola hepatica						
Number positive	0	1	0	1	0	2
Percent positive		0.2		0.2		0.1
Chi-Square signif.	0.6161					
Giardia lamblia						
Number positive	18	20	26	16	20	100
Percent positive	6.0	3.2	3.8	2.7	3.1	3.5
Chi-Square signif.	0.1162					
Entameoba histolytica						
Number positive	17	44	31	35	38	165
Percent positive	5.7	7.0	4.5	5.9	5.9	5.8
Chi-Square signif.	0.4534					
Entameoba coli						
Number positive	156	335	342	294	153	1280
Percent positive	52.0	53.1	49.9	49.3	23.8	44.8
Chi-Square signif.	0.0000					
Entameoba hartmanni						
Number positive	2	8	3	11	13	37
Percent positive	0.7	1.3	0.4	1.8	2.0	1.3
Chi-Square signif.	0.0633					

III.2 Table IV (continued)

Parasite	STUDY SITE CODE 11	12	13	14	15	Total
Iodamoeba butschlii						
Number positive	2	13	5	8	3	31
Percent positive	0.7	2.1	0.7	1.3	0.5	1.1
Chi-Square signif.	0.0487					
Endolimax nana						
Number positive	2	1	1	3	1	8
Percent positive	0.7	0.2	0.1	0.5	0.2	0.3
Chi-Square signif.	0.4333					
Chilomastix mesnili						
Number positive	1	4	1	2	3	11
Percent positive	0.3	0.6	0.1	0.3	0.5	0.4
Chi-Square signif.	0.6977					
Trichomonas hominis						
Dientamoeba fragilis						

Appendix III.2 Table V

Beni Suef. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Drinking Water

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	17	0	17
Percent	1.5		1.5
Negative			
Number	1094	14	1108
Percent	98.5	100	98.5
N = 1125 DF = 1 Chi-Square Significance = 0.6409, Statistic = 0.21751			
Ancylostoma duodenale			
Positive			
Number	40	0	40
Percent	3.6		3.6
Negative			
Number	1071	14	1085
Percent	96.4	100	96.4
N = 1125 DF = 1 Chi-Square Significance = 0.4697, Statistic = 0.52263			
Giardia lamblia			
Positive			
Number	46	0	46
Percent	4.1		4.1
Negative			
Number	1065	14	1079
Percent	95.9	100	95.9
N = 1125 DF = 1 Chi-Square Significance = 0.4369, Statistic = 0.60437			
Entameoba histolytica			
Positive			
Number	54	1	55
Percent	4.9	7.1	4.9
Negative			
Number	1057	13	1070
Percent	95.1	92.9	95.1
N = 1125 DF = 1 Chi-Square Significance = 0.6939, Statistic = 0.15439			
Entameoba coli			
Positive			
Number	443	8	451
Percent	39.9	57.1	40.1
Negative			
Number	668	6	674
Percent	60.1	42.9	59.9
N = 1125 DF = 1 Chi-Square Significance = 0.1901, Statistic = 1.7167			

Appendix III.2 Table VI

Beni Suef. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Bathing Water

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	17	0	17
Percent	1.5		1.5
Negative			
Number	1094	14	1108
Percent	98.5	100	98.5
N = 1125 DF = 1 Chi-Square Significance = 0.6409, Statistic = 0.21751			
Ancylostoma duodenale			
Positive			
Number	40	0	40
Percent	3.6		3.6
Negative			
Number	1071	14	1085
Percent	96.4	100	96.4
N = 1125 DF = 1 Chi-Square Significance = 0.4697, Statistic = 0.52263			
Giardia lamblia			
Positive			
Number	46	0	46
Percent	4.1		4.1
Negative			
Number	1065	14	1079
Percent	95.9	100	95.9
N = 1125 DF = 1 Chi-Square Significance = 0.4369, Statistic = 0.60437			
Entameoba histolytica			
Positive			
Number	54	1	55
Percent	4.9	7.1	4.9
Negative			
Number	1057	13	1070
Percent	95.1	92.9	95.1
N = 1125 DF = 1 Chi-Square Significance = 0.6939, Statistic = 0.15489			
Entameoba coli			
Positive			
Number	443	8	451
Percent	39.9	57.1	40.1
Negative			
Number	668	6	674
Percent	60.1	42.9	59.9
N = 1125 DF = 1 Chi-Square Significance = 0.1901, Statistic = 1.7167			

Appendix III.2 Table VII

Beni Suef. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Laundry Water

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	17	0	17
Percent	1.5		1.5
Negative			
Number	1094	14	1108
Percent	98.5	100	98.5
N = 1125 DF = 1 Chi-Square Significance = 0.6409, Statistic = 0.21751			
Ancylostoma duodenale			
Positive			
Number	40	0	40
Percent	3.6		3.6
Negative			
Number	1071	14	1085
Percent	96.4	100	96.4
N = 1125 DF = 1 Chi-Square Significance = 0.4697, Statistic = 0.52263			
Giardia lamblia			
Positive			
Number	46	0	46
Percent	4.1		4.1
Negative			
Number	1065	14	1079
Percent	95.9	100	95.9
N = 1125 DF = 1 Chi-Square Significance = 0.4369, Statistic = 0.60437			
Entameoba histolytica			
Positive			
Number	54	1	55
Percent	4.9	7.1	4.9
Negative			
Number	1057	13	1070
Percent	95.1	92.9	95.1
N = 1125 DF = 1 Chi-Square Significance = 0.6939, Statistic = 0.15489			
Entameoba coli			
Positive			
Number	443	8	451
Percent	39.9	57.1	40.1
Negative			
Number	668	6	674
Percent	60.1	42.9	59.9
N = 1125 DF = 1 Chi-Square Significance = 0.1901, Statistic = 1.7167			

Appendix III.2 Table VIII

Beni Suef. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Utensil Water

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	17	0	17
Percent	1.5		1.5
Negative			
Number	1094	14	1108
Percent	98.5	100	98.5
N = 1125 DF = 1	Chi-Square Significance = 0.6409, Statistic = 0.21751		
Ancylostoma duodenale			
Positive			
Number	40	0	40
Percent	3.6		3.6
Negative			
Number	1071	14	1085
Percent	96.4	100	96.4
N = 1125 DF = 1	Chi-Square Significance = 0.4697, Statistic = 0.5[illegible]3		
Giardia lamblia			
Positive			
Number	46	0	46
Percent	4.1		4.1
Negative			
Number	1065	14	1079
Percent	95.9	100	95.9
N = 1125 DF = 1	Chi-Square Significance = 0.4369, Statistic = 0.60437		
Entameoba histolytica			
Positive			
Number	54	1	55
Percent	4.9	7.1	4.9
Negative			
Number	1057	13	1070
Percent	95.1	92.9	95.1
N = 1125 DF = 1	Chi-Square Significance = 0.6939, Statistic = 0.15489		
Entameoba coli			
Positive			
Number	443	8	451
Percent	39.9	57.1	40.1
Negative			
Number	668	6	674
Percent	60.1	42.9	59.9
N = 1125 DF = 1	Chi-Square Significance = 0.1901, Statistic = 1.7167		

Appendix III.2 Table IX

Beni Suef. Percent Prevalence of Selected Parasites by Type of Water Supply: Drinking Water Piped Outside

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	11	6	17
Percent	1.3	2.0	1.5
Negative			
Number	814	294	1108
Percent	98.7	98.0	98.5
N = 1125 DF = 1 Chi-Square Significance = 0.4176, Statistic = 0.65699			
Ancylostoma duodenale			
Positive			
Number	27	13	40
Percent	3.3	4.3	3.6
Negative			
Number	798	287	1085
Percent	96.7	95.7	96.4
N = 1125 DF = 1 Chi-Square Significance = 0.3956, Statistic = 0.72168			
Giardia lamblia			
Positive			
Number	40	6	46
Percent	4.8	2.0	4.1
Negative			
Number	785	294	1079
Percent	95.2	98.0	95.9
N = 1125 DF = 1 Chi-Square Significance = 0.0329, Statistic = 4.5517			
Entameoba histolytica			
Positive			
Number	36	19	55
Percent	4.4	6.3	4.9
Negative			
Number	789	281	1070
Percent	95.6	93.7	95.1
N = 1125 DF = 1 Chi-Square Significance = 0.1755, Statistic = 1.8356			
Entameoba coli			
Positive			
Number	312	139	451
Percent	37.8	46.3	40.1
Negative			
Number	513	161	674
Percent	62.2	53.7	59.9
N = 1125 DF = 1 Chi-Square Significance = 0.0100, Statistic = 6.6417			

Appendix III.2 Table X

Beni Suef. Percent Prevalence of Selected Parasites by Type of Water Supply: Bathing Water Piped Outside

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	13	4	17
Percent	1.6	1.4	1.5
Negative			
Number	819	289	1108
Percent	98.4	98.6	98.5
N = 1125 DF = 1 Chi-Square Significance = 0.8118, Statistic = 0.56684 -1			
Ancylostoma duodenale			
Positive			
Number	27	13	40
Percent	3.2	4.4	3.6
Negative			
Number	805	280	1085
Percent	96.8	95.6	96.4
N = 1125 DF = 1 Chi-Square Significance = 0.3435, Statistic = 0.89735			
Giardia lamblia			
Positive			
Number	41	5	46
Percent	4.9	1.7	4.1
Negative			
Number	791	288	1079
Percent	95.1	98.3	95.9
N = 1125 DF = 1 Chi-Square Significance = 0.0166, Statistic = 5.7339			
Entameoba histolytica			
Postive			
Number	37	18	55
Percent	4.4	6.1	4.9
Negative			
Number	795	275	1070
Percent	95.6	93.9	95.1
N = 1125 DF = 1 Chi-Square Significance = 0.2469, Statistic = 1.3408			
Entameoba coli			
Positive			
Number	318	133	451
Percent	38.2	45.4	40.1
Negative			
Number	514	160	674
Percent	61.8	54.6	59.9
N = 1125 DF = 1 Chi-Square Significance = 0.312, Statistic = 4.6399			

Appendix III.2 Table XI

Beni Suef. Percent Prevalence of Selected Parasites by Type of Water Supply: Laundry Water Piped Outside

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	13	4	17
Percent	1.5	1.5	1.5
Negative			
Number	847	261	1108
Percent	98.5	98.5	98.5
N = 1125 DF = 1 Chi-Square Significance = 0.9980, Statistic = 0.65518 -5			
Ancylostoma duodenale			
Positive			
Number	27	13	40
Percent	3.1	4.9	3.6
Negative			
Number	833	252	1085
Percent	96.9	95.1	96.4
N = 1125 DF = 1 Chi-Square Significance = 0.1746, Statistic = 1.8427			
Giardia lamblia			
Positive			
Number	41	5	46
Percent	4.8	1.9	4.1
Negative			
Number	819	260	1079
Percent	95.2	98.1	95.9
N = 1125 DF = 1 Chi-Square Significance = 0.0384, Statistic = 4.2865			
Entameoba histolytica			
Positive			
Number	39	16	55
Percent	4.5	6.0	4.9
Negative			
Number	821	249	1070
Percent	95.5	94.0	95.1
N = 1125 DF = 1 Chi-Square Significance = 0.3212, Statistic = 0.98397			
Entameoba coli			
Positive			
Number	324	127	451
Percent	37.7	47.9	40.1
Negative			
Number	536	138	674
Percent	62.3	52.1	59.9
N = 1125 DF = 1 Chi-Square Significance = 0.0029, Statistic = 8.8617			

Appendix III.2 Table XII

Beni Suef. Percent Prevalence of Selected Parasites by Type of Water Supply: Utensil Water Piped Outside

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	13	4	17
Percent	1.5	1.6	1.5
Negative			
Number	863	245	1108
Percent	98.5	98.4	98.5
N = 1125 DF = 1 Chi-Square Significance = 0.8889, Statistic = 0.19520 -1			
Ancylostoma duodenale			
Positive			
Number	27	13	40
Percent	3.1	5.2	3.6
Negative			
Number	849	236	1085
Percent	96.9	94.8	96.4
N = 1125 DF = 1 Chi-Square Significance = 0.1078, Statistic = 2.5862			
Giardia lamblia			
Positive			
Number	41	5	46
Percent	4.7	2.0	4.1
Negative			
Number	835	244	1079
Percent	95.3	98.0	95.9
N = 1125 DF = 1 Chi-Square Significance = 0.0602, Statistic = 3.5307			
Entameoba histolytica			
Positive			
Number	39	16	55
Percent	4.5	6.4	4.9
Negative			
Number	837	233	1070
Percent	95.5	93.6	95.1
N = 1125 DF = 1 Chi-Square Significance =0.2025, Statistic = 1.6242			
Entameoba coli			
Positive			
Number	331	120	451
Percent	37.8	48.2	40.1
Negative			
Number	545	129	674
Percent	62.2	51.8	59.9
N = 1125 DF = 1 Chi-Square Significance = 0.0031, Statistic = 8.7438			

Appendix III.3 Table I

Aswan: Percent Prevalence of Selected Parasites by Latrine

	Latrine		
Parasite	Present	Absent	Total
Ascaris lumbricoides			
Positive			
Number	43	13	56
Percent	3.9	2.1	3.3
Negative			
Number	1061	598	1659
Percent	96.1	97.9	96.7
N = 1715 DF = 1 Chi-Square Significance = 0.0486, Statistic = 3.8891			
Ancylostoma duodenale			
Positive			
Number	3	2	5
Percent	0.3	0.3	0.3
Negative			
Number	1101	609	1710
Percent	99.7	99.7	99.7
N = 1715 DF = 1 Chi-Square Significance = 0.8389, Statistic = 0.41817-1			
Hymenolepis nana			
Positive			
Number	63	29	92
Percent	5.7	4.7	5.4
Negative			
Number	1041	582	1623
Percent	94.3	95.3	94.6
N = 1715 DF = 1 Chi-Square Significance = 0.3980, Statistic = 0.71432			
Giardia lamblia			
Positive			
Number	120	39	159
Percent	10.9	6.4	9.3
Negative			
Number	984	572	1556
Percent	89.1	93.6	90.7
N = 1715 DF = 1 Chi-Square Significance = 0.0022, Statistic = 9.4124			

III.3 Table I (continued)

Parasite	Latrine Present	 Absent	Total
Entameoba histolytica			
Positive			
Number	80	32	112
Percent	7.2	5.2	6.5
Negative			
Number	1024	579	1603
Percent	92.8	94.8	93.5
N = 1715 DF = 1 Chi-Square Significance = 0.1068, Statistic = 2.6008			
Entameoba coli			
Positive			
Number	411	192	603
Percent	37.2	31.4	35.2
Negative			
Number	693	419	1112
Percent	62.8	68.6	64.8
N = 1715 DF = 1 Chi-Square Significance = 0.0159, Statistic = 5.8125			

Appendix III.3 Table II

Aswan. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Drinking Water

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	33	16	49
Percent	2.2	9.3	2.9
Negative			
Number	1493	156	1649
Percent	97.8	90.7	97.1
N = 1698 DF = 1 Chi-Square Significance = 0.0000, Statistic = 28.118			
Ancylostoma duodenale			
Positive			
Number	5	0	5
Percent	0.3		0.3
Negative			
Number	1521	172	1693
Percent	99.7	100	99.7
N = 1693 DF = 1 Chi-Square Significance = 0.4522, Statistic = 0.56523			
Giardia lamblia			
Positive			
Number	124	24	148
Percent	8.1	14.0	8.7
Negative			
Number	1402	148	1550
Percent	91.9	86.0	91.3
N = 1698 DF = 1 Chi-Square Significance = 0.0102, Statistic = 6.5981			
Entameoba histolytica			
Positive			
Number	80	16	96
Percent	5.2	9.3	5.7
Negative			
Number	1446	156	1602
Percent	94.8	90.7	94.3
N = 1698 DF = 1 Chi-Square Significance = 0.289, Statistic = 4.7765			
Entameoba coli			
Positive			
Number	504	81	585
Percent	33.0	47.1	34.5
Negative			
Number	1022	91	1113
Percent	67.0	52.9	65.5
N = 1698 DF = 1 Chi-Square Significance = 0.0002, Statistic = 13.542			

Appendix III.3 Table III

Aswan. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Bathing Water

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	33	16	49
Percent	2.9	2.2	9.4
Negative			
Number	1495	154	1649
Percent	97.8	90.6	97.1
N = 1698 DF = 1 Chi-Square Significance = 0.0000, Statistic = 28.709			
Ancylostoma duodenale			
Positive			
Number	5	0	5
Percent	0.3		0.3
Negative			
Number	1523	170	1693
Percent	99.7	100	99.7
N = 1698 DF = 1 Chi-Square Significance = 0.4551, Statistic = 0.55793			
Giardia lamblia			
Positive			
Number	124	24	148
Percent	8.1	14.1	8.7
Negative			
Number	1404	146	1550
Percent	91.9	85.9	91.3
N = 1698 DF = 1 Chi-Square Significance = 0.0085, Statistic = 6.9273			
Entameoba histolytica			
Positive			
Number	80	16	96
Percent	5.2	9.4	5.7
Negative			
Number	1448	154	1602
Percent	94.8	90.6	94.3
N = 1698 DF = 1 Chi-Square Significance = 0.0253, Statistic = 5.0019			
Entameoba coli			
Positive			
Number	505	80	585
Percent	33.0	47.1	34.5
Negative			
Number	1023	90	1113
Percent	67.0	52.9	65.5
N = 1698 DF = 1 Chi-Square Significance = 0.0003, Statistic = 13.295			

Appendix III.3 Table IV

Aswan. Percent Prevalence of Selected Parasites by Type of Water Supply: Piped-in Laundry Water

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	33	16	49
Percent	2.2	9.4	2.9
Negative			
Number	1495	154	1649
Percent	97.8	90.6	97.1
N = 1698 DF = 1 Chi-Square Significance = 0.0000, Statistic = 28.709			
Ancylostoma duodenale			
Positive			
Number	5	0	5
Percent	0.3		0.3
Negative			
Number	1523	170	1693
Percent	99.7	100	99.7
N = 1698 DF = 1 Chi-Square Significance = 0.4551, Statistic = 0.55793			
Giardia lamblia			
Positive			
Number	124	24	148
Percent	8.1	14.1	8.7
Negative			
Number	1404	146	1550
Percent	91.9	85.9	91.3
N = 1698 DF = 1 Chi-Square Significance = 0.0085, Statistic = 6.9275			
Entameoba histolytica			
Positive			
Number	80	16	96
Percent	5.2	9.4	5.7
Negative			
Number	1448	154	1602
Percent	94.8	90.6	94.3
N = 1698 DF = 1 Chi-Square Significance = 0.0253, Statistic = 5.0019			
Entameoba coli			
Positive			
Number	505	80	585
Percent	33.0	47.1	34.5
Negative			
Number	1023	90	1113
Percent	65.5	67.0	52.9
N = 1698 DF = 1 Chi-Square Significance = 0.0085, Statistic = 13.295			

Appendix III.3 Table V

Aswan. Percent Prevalence of Selected Parasites by Type of Water Supply: Water Piped in for Utensils

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	33	16	49
Percent	2.2	9.4	2.9
Negative			
Number	1495	154	1649
Percent	97.8	90.6	97.1
N = 1698 DF = 1 Chi-Square Significance = 0.0000, Statistic = 28.709			
Ancylostoma duodenale			
Positive			
Number	5	0	5
Percent	0.3		0.3
Negative			
Number	1523	170	1693
Percent	99.7	100	99.7
N = 1698 DF = 1 Chi-Square Significance = 0.4551, Statistic = 0.55793			
Giardia lamblia			
Positive			
Number	124	24	148
Percent	8.1	14.1	8.7
Negative			
Number	1404	146	1550
Percent	91.9	85.9	91.3
N = 1698 DF = 1 Chi-Square Significance = 0.0085, Statistic = 6.9275			
Entameoba histolytica			
Positive			
Number	80	16	96
Percent	5.2	9.4	5.7
Negative			
Number	1448	154	1602
Percent	94.8	90.6	94.3
N = 1698 DF = 1 Chi-Square Significance = 0.253, Statistic = 5.0019			
Entameoba coli			
Positive			
Number	505	80	585
Percent	33.0	47.1	34.5
Negative			
Number	1023	90	1113
Percent	67.0	52.9	65.5
N = 1698 DF = 1 Chi-Square Significance = 0.0003, Statistic = 13.295			

Appendix III.3 Table VI

Aswan. Percent Prevalence of Selected Parasites by Type of Water Supply: Drinking Water Piped Outside

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	25	24	49
Percent	3.1	2.7	2.9
Negative			
Number	789	860	1649
Percent	96.9	97.3	97.1

N = 1698 DF = 1 Chi-Square Significance = 0.6613, Statistic = 0.19199

Parasite	No	Yes	Total
Ancylostoma duodenale			
Positive			
Number	2	3	5
Percent	0.2	0.3	0.3
Negative			
Number	812	881	1693
Percent	99.8	99.7	99.7

N = 1698 DF = 1 Chi-Square Significance = 0.7219, Statistic = 0.12664

Parasite	No	Yes	Total
Giardia lamblia			
Positive			
Number	79	69	148
Percent	9.7	7.8	8.7
Negative			
Number	735	815	1550
Percent	90.3	92.2	91.3

N = 1698 DF = 1 Chi-Square Significance = 0.1656, Statistic = 1.9222

Parasite	No	Yes	Total
Entameoba histolytica			
Positive			
Number	59	37	96
Percent	7.2	4.2	5.7
Negative			
Number	755	847	1602
Percent	92.8	95.8	94.3

N = 1698 DF = 1 Chi-Square Significance = 0.0063, Statistic = 7.4520

Parasite	No	Yes	Total
Entameoba coli			
Positive			
Number	308	277	585
Percent	37.8	31.3	34.5
Negative			
Number	506	607	1113
Percent	62.2	68.7	65.5

N = 1698 DF = 1 Chi-Square Significance = 0.0048, Statistic = 7.9358

Appendix III.3 Table VII

Aswan. Percent Prevalence of Selected Parasites by Type of Water Supply: Bathing Water Piped Outside

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	25	24	49
Percent	3.0	2.7	2.9
Negative			
Number	796	853	1649
Percent	97.0	97.3	97.1

N = 1698 DF = 1 Chi-Square Significance = 0.7044, Statistic = 0.14397

Parasite	No	Yes	Total
Ancylostoma duodenale			
Positive			
Number	2	3	5
Percent	0.2	0.3	0.3
Negative			
Number	819	874	1693
Percent			

N = 1698 DF = 1 Chi-Square Significance = 0.7082, Statistic = 0.14004

Parasite	No	Yes	Total
Giardia lamblia			
Positive			
Number	79	69	148
Percent	9.6	7.9	8.7
Negative			
Number	742	808	1550
Percent	90.4	92.1	91.3

N = 1698 DF = 1 Chi-Square Significance = 0.20[illegible]2, Statistic = 1.6408

Parasite	No	Yes	Total
Entameoba histolytica			
Positive			
Number	59	37	96
Percent	5.7	7.2	4.2
Negative			
Number	762	840	1602
Percent	92.8	95.8	94.3

N = 1698 DF = 1 Chi-Square Significance = 0.0082, Statistic = 7.0002

Parasite	No	Yes	Total
Entameoba coli			
Positive			
Number	309	276	585
Percent	37.6	31.5	34.5
Negative			
Number	512	601	1113
Percent	62.4	68.5	65.5

N = 1693 DF = 1 Chi-Square Significance = 0.0075, Statistic = 7.1392

Appendix III.3 Table VIII

Aswan. Percent Prevalence of Selected Parasites by Type of Water Supply: Laundry Water Piped Outside

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	25	24	49
Percent	3.0	2.7	2.9
Negative			
Number	796	853	1649
Percent	97.0	97.3	97.1
N = 1698 DF = 1 Chi-Square Significance = 0.7044, Statistic = 0.14397			
Ancylostoma duodenale			
Positive			
Number	2	3	5
Percent	0.2	0.3	0.3
Negative			
Number	819	874	1693
Percent	99.8	99.7	99.7
N = 1698 DF = 1 Chi-Square Significance = 0.7082, Statistic = 0.14004			
Giardia lamblia			
Positive			
Number	79	69	148
Percent	9.6	7.9	8.7
Negative			
Number	742	808	1550
Percent	90.4	92.1	91.3
N = 1698 DF = 1 Chi-Square Significance = 0.2002, Statistic = 1.6409			
Entameoba histolytica			
Positive			
Number	59	37	96
Percent	7.2	4.2	5.7
Negative			
Number	762	840	1602
Percent	92.8	95.8	94.3
N = 1698 DF = 1 Chi-Square Significance = 0.0082, Statistic = 7.0002			
Entameoba coli			
Positive			
Number	309	276	585
Percent	37.6	31.5	34.5
Negative			
Number	512	601	1113
Percent	62.4	68.5	65.5
N = 1698 DF = 1 Chi-Square Significance = 0.0075, Statistic = 7.1392			

Appendix III.3 Table IX

Aswan. Percent Prevalence of Selected Parasites by Type of Water Supply: Utensil Water Piped Outside

Parasite	No	Yes	Total
Ascaris lumbricoides			
Positive			
Number	25	24	49
Percent	3.0	2.7	2.9
Negative			
Number	796	853	1649
Percent	97.0	97.3	97.1
N = 1698 DF = 1 Chi-Square Significance = 0.7044, Statistic = 0.14397			
Ancylostoma duodenale			
Positive			
Number	2	3	5
Percent	0.2	0.3	0.3
Negative			
Number	819	874	1693
Percent	99.8	99.7	99.7
N = 1698 DF = 1 Chi-Square Significance = 0.7082, Statistic = 0.14004			
Giardia lamblia			
Positive			
Number	79	69	148
Percent	9.6	7.9	8.7
Negative			
Number	742	808	1550
Percent	90.4	92.1	91.3
N = 1698 DF = 1 Chi-Square Significance = 0.2002, Statistic = 1.6409			
Entameoba histolytica			
Positive			
Number	59	37	96
Percent	7.2	4.2	5.7
Negative			
Number	762	840	1602
Percent	92.8	95.8	94.3
N = 1698 DF = 1 Chi-Square Significance = 0.0082, Statistic = 7.0002			
Entameoba coli			
Positive			
Number	309	276	585
Percent	37.6	31.5	34.5
Negative			
Number	512	601	1113
Percent	62.4	68.5	65.5
N = 1698 DF = 1 Chi-Square Significance = 0.0075, Statistic = 7.1392			

APPENDIX IV.1

TABLE I

Construction Material of House, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Material	11	12	13	14	15	16	17	18	19	20
Stone or red Brick	8	22	5	8	8	51	9	20	46	25
Mud Brick	93	123	120	181	117	139	182	161	141	152
Wood or Reed	0	1	1	0	0	0	0	0	0	3
Mud and red Brick	2	55	81	8	65	7	2	5	10	35
Mud Brick and Wood or Reed	4	0	4	0	7	2	4	0	0	0
No information	0	0	1	0	2	0	2	5	0	0
Total	107	201	212	197	199	199	199	191	197	215

IV.1

TABLE II

Structure Attachment of House, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Attachment	11	12	13	14	15	16	17	18	19	20
Detached	2	1	3	4	3	17	0	17	33	17
One Side only	10	10	41	10	8	42	8	29	70	26
Two Sides	50	51	117	61	43	124	57	99	91	168
Three Sides	42	139	50	122	144	15	125	43	3	0
No information	3	0	1	0	1	1	9	3	0	4
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1

TABLE III

Number of houses with Painted walls, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Painted	11	12	13	14	15	16	17	18	19	20
Exterior	4	1	4	4	2	3	7	11	6	9
Interior	8	27	16	6	14	36	21	32	57	25
None	82	148	19	168	124	152	163	120	109	177
Exterior and Interior	13	23	166	18	54	8	6	25	22	3
No information	0	2	7	1	5	0	2	3	3	1
Total	107	201	212	197	199	199	199	191	197	215

IV.1

TABLE IV

Number of Houses with Staircase, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Staircase	11	12	13	14	15	16	17	18	19	20
Fixed	72	152	138	102	119	132	180	87	16	119
Mobile	12	15	12	20	48	57	8	59	151	68
None	18	31	55	69	28	3	10	35	28	20
No information	5	3	7	6	4	7	1	10	2	8
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1

TABLE V

Number of Houses by Type of Roof Material,
Raw Counts, for Beni Suef and Kafr El Sheikh

Roof Material	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
Reed and Mud	34	60	20	0	15	0	0	38	0	1
Wood, Reed and Mud	1	6	0	0	109	158	6	45	0	1
Concrete	3	1	3	2	1	24	10	17	27	17
Wood	10	23	43	143	1	3	7	4	9	5
Reed	9	81	22	31	9	0	1	1	4	4
Mud	40	6	1	0	3	2	0	0	0	173
Concrete and Wood	0	0	6	0	0	2	0	1	6	0
Concrete and Reed	0	0	0	0	1	0	0	1	1	2
Concrete and Mud	0	0	0	0	1	0	0	0	0	10
Concrete, Wood and Reed	0	0	0	0	0	2	0	1	0	0
Wood and Reed	7	23	105	19	6	4	174	57	149	0
No information	0	0	1	0	1	0	0	1	0	0
Total	107	201	212	197	199	199	199	191	197	215

IV.1

TABLE VI

Number of Houses by Roof condition, Raw
Counts, for Beni Suef and Kafr El Sheikh

Roof Condition	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
Permeable	41	13	90	161	10	170	195	156	165	170
Non-permeable	56	187	119	29	162	22	3	32	22	25
No information	10	1	3	7	27	7	1	3	10	20
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1 TABLE VII

Number of Houses by Storage location of Cooking and Heating Feul, Raw Counts, for Beni Suef and Kafr El Sheikh

Storage of Fuel Materials	Study site code									
	Beni Suef					Kafr El Sheikh				
	11	12	13	14	15	16	17	18	19	20
None present	4	1	2	1	2	0	0	1	0	0
Roof	88	178	168	145	190	199	195	183	187	203
Stable	4	3	9	0	1	0	1	2	1	3
Storage Room	0	1	0	0	0	0	0	4	5	1
Yard	8	17	31	51	4	0	3	0	4	8
Roof and Storage Room	1	1	0	0	1	0	0	0	0	0
Roof and Yard	1	0	1	0	0	0	0	0	0	0
No information	1	0	1	0	1	0	0	1	0	0
Total	107	201	212	197	199	199	199	191	197	215

IV.1 TABLE VIII

Number of Houses by Type of Floor Construction, Raw Counts, for Beni Suef and Kafr El Sheikh

Floor Construction	Study site code									
	Beni Suef					Kafr El Sheikh				
	11	12	13	14	15	16	17	18	19	20
Tile and Wood	0	0	0	0	0	3	0	1	8	0
Earth	91	162	185	179	157	172	194	170	161	204
Concrete	4	1	0	2	0	4	2	2	1	3
Tile	5	11	6	8	12	13	1	9	18	3
Wood	2	0	0	1	0	1	0	0	1	1
Earth and Concrete	0	1	5	0	1	0	1	2	2	2
Earth and Tile	2	13	14	6	28	1	0	4	0	0
Earth and Wood	0	0	0	0	0	1	0	0	1	1
Earth, Concrete, Tile	0	1	0	0	0	2	0	0	1	1
No information	3	12	2	1	1	2	1	3	4	0
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1

TABLE IX

Number of Houses by the number of windows, Raw Counts, for Beni Suef and Kafr El Sheikh

Number of Windows	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
1	29	54	43	63	50	2	59	12	12	34
2	27	31	47	33	47	7	63	36	29	35
3	9	26	44	14	40	14	26	35	26	36
4	13	19	28	8	16	70	13	41	56	29
5	4	9	9	6	9	48	7	13	30	20
6	10	4	10	1	4	18	5	19	17	18
7	0	0	3	1	0	23	0	14	18	9
8	0	2	3	2	0	13	1	6	3	12
9	1	1	0	1	0	2	0	5	2	2
10 or more	2	2	3	1	0	2	1	5	4	15
No information	12	53	22	67	33	0	24	5	0	5
Total	107	201	212	197	199	199	199	191	197	215

IV.1

TABLE X

Number of Houses by Type of Lighting, Raw Counts, for Beni Suef and Kafr El Sheikh

Lighting	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
Electricity	30	45	67	0	73	100	14	58	4	0
Kerosene	71	149	142	195	123	95	176	130	192	213
Other	1	2	1	1	2	0	0	0	1	2
Electricity and Kerosene	1	0	0	0	0	4	9	0	0	0
No information	4	5	2	1	1	0	0	3	0	0
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1

TABLE XI

Number of Houses with Television, Raw Counts, for Beni Suef and Kafr El Sheikh

Television	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
Present	4	5	5	1	7	6	4	9	5	1
Not Present	93	172	201	195	190	193	192	177	192	214
No information	10	24	6	1	2	0	3	5	0	0
Total	107	201	212	197	199	199	199	191	197	215

IV.1

TABLE XII

Number of Houses by Number of Rooms in House, Raw Counts, for Beni Suef and Kafr El Sheikh

Number of Rooms in House	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
1	12	48	26	64	1	3	58	4	3	8
2	29	47	55	51	15	60	69	34	5	38
3	16	41	61	46	32	94	43	44	15	43
4	21	21	29	16	48	34	17	50	18	48
5	10	14	16	9	36	5	2	20	24	20
6	7	8	9	4	27	2	2	14	47	30
7	0	7	7	4	16	1	1	10	65	9
8 or more	6	9	6	2	22	0	2	12	20	19
No information	6	6	3	1	2	0	5	3	0	0
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1

TABLE XIII

Number of Houses by Number of Occupants in House, Raw Counts, for Beni Suef and Kafr El Sheikh

Number of Occupants	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
1	5	10	10	30	10	6	6	1	17	8
2	5	18	16	36	14	28	15	6	33	38
3	7	22	24	24	18	35	29	9	23	26
4	15	23	18	31	34	26	35	17	30	31
5	25	23	27	26	25	38	31	11	21	34
6	13	24	33	20	24	25	23	25	27	26
7	10	24	19	14	21	27	17	22	8	18
8	7	11	26	7	12	8	12	20	14	15
9	7	13	12	5	16	4	17	13	9	11
10 or more	12	31	25	2	19	2	4	65	7	7
No information	1	2	2	2	6	0	0	2	8	1
Total	107	201	212	197	199	199	199	191	197	215

IV.1

TABLE XIV

Number of Houses by Presence and Location of Stable, Raw Counts, for Beni Suef and Kafr El Sheikh

Stable	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
Inside	69	148	130	88	184	150	140	120	105	147
Outside	3	3	10	5	3	6	5	15	8	9
None	31	46	69	102	10	39	18	52	82	42
No information	4	4	3	2	2	4	36	4	2	7
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1 TABLE XV

Number of Houses with Waste Container, Raw Counts, for Beni Suef and Kafr El Sheikh

Waste Container	Study site code									
	Beni Suef					Kafr El Sheikh				
	11	12	13	14	15	16	17	18	19	20
Yes	2	29	2	1	0	4	3	6	3	60
No	95	170	209	191	198	194	193	179	191	139
No information	10	2	1	5	1	1	3	6	3	16
Total	107	201	212	197	199	199	199	191	197	215

IV.1 TABLE XVI

Number of Houses by method of disposal of animal waste, Raw Counts, for Beni Suef and Kafr El Sheikh

Animal Waste Material	Study site code									
	Beni Suef					Kafr El Sheikh				
	11	12	13	14	15	16	17	18	19	20
Stable	10	1	98	1	19	3	1	0	3	89
Yard	12	2	1	2	[illegible]	0	1	9	2	2
Street	7	9	9	1	28	171	144	62	17	26
Canal	3	0	2	0	0	1	0	42	86	1
Roof	58	60	0	83	74	0	0	5	2	1
None	14	115	98	107	72	13	19	67	85	80
No information	3	14	4	3	2	11	34	6	2	16
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1

TABLE XVII

Number of Houses by Type of Cooking Fuel, Raw Counts, for Ben Suef and Kafr El Sheikh

Cooking Fuel	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
Wood and Dung	5	14	0	83	72	27	22	40	57	1
Oil, Wood and Dung	0	8	0	0	24	109	53	34	0	0
Gas	6	3	1	2	0	0	1	2	0	2
Oil	10	41	1	29	6	8	5	4	1	21
Wood	4	0	0	73	3	5	5	2	0	1
Dung	74	70	143	1	87	0	27	2	4	16
Gas and Oil	0	1	3	0	0	0	0	0	0	2
Gas and Wood	1	1	0	3	1	0	0	2	1	0
Gas and Dung	0	0	5	0	0	0	1	0	0	1
Gas, Oil, and Wood	0	0	0	0	1	2	0	0	0	0
Oil and Wood	1	16	0	3	1	27	74	38	126	0
No information	6	47	59	3	4	21	11	67	8	171
Total	107	201	212	197	199	199	199	191	197	215

IV.1

TABLE XVIII

Number of Houses by Cleaning of Stable, Raw Counts, for Beni Suef and Kafr El Sheikh

Stable Cleaning	Study site code Beni Suef 11	12	13	14	15	Kafr El Sheikh 16	17	18	19	20
Daily	82	101	86	41	63	174	140	118	110	147
Weekly	4	32	34	46	80	2	2	19	0	29
Monthly	0	18	25	1	36	0	2	0	1	0
Never	18	30	2	6	11	2	9	35	82	17
No information	3	20	65	102	9	20	46	19	2	21
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1

TABLE XIX

Number of Houses by Type of Approach, Raw Counts, for Beni Suef and Kafr El Sheikh

House Approach	Study site code Beni Suef 11	 12	 13	 14	 15	 Kafr El Sheikh 16	 17	 18	 19	 20
Non-earth:										
Clean	46	84	207	178	68	166	1	163	1	26
Littered	0	0	0	1	0	9	0	0	0	6
Dry	60	1	2	12	96	12	175	5	2	179
Wet	0	2	0	1	34	10	7	20	0	0
Earth:										
Clean	0	15	1	0	0	1	0	1	0	0
Littered	0	0	1	0	0	0	0	0	0	0
Dry	0	0	0	0	0	0	0	0	0	1
Wet	0	0	0	0	0	0	1	0	0	0
No information	1	99	1	5	1	1	15	2	194	3
Total	107	201	212	197	199	199	199	191	197	215

IV.1

TABLE XX

Number of Houses Owned and Rented, Raw Counts, for Beni Suef and Kafr El Sheikh

Ownership	Study site code Beni Suef 11	 12	 13	 14	 15	 Kafr El Sheikh 16	 17	 18	 19	 20
Own	2	15	2	4	12	4	2	9	19	2
Rent	96	179	207	149	185	195	192	179	163	199
No information	9	7	3	4	2	0	5	3	15	4
Total	107	201	212	197	199	199	199	191	197	215

APPENDIX IV.1

TABLE XXI

Storage of Water by Number of Houses,
Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Material	11	12	13	14	15	16	17	18	19	20
Metal	1	0	0	0	0	2	1	3	2	2
Earthenware	107	193	209	197	192	186	189	186	195	215
Ceramic	0	0	1	0	1	0	8	0	0	1
Metal and Ceramic	0	0	1	0	0	11	0	0	1	0
Metal and Earthenware	0	0	0	0	1	0	0	0	0	0
No information	2	0	1	0	3	0	1	1	1	0
Total	110	193	212	197	197	199	199	190	199	218

IV.1

TABLE XXII

Wastewater Drainage by Number of Houses,
Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Material	11	12	13	14	15	16	17	18	19	20
Concrete	0	0	6	0	1	0	2	5	2	4
Pipe	2	1	1	2	0	10	0	0	1	42
Brick	2	0	0	0	0	98	0	2	0	1
Tile	1	0	2	0	0	5	0	7	0	1
Earth	102	188	193	15	0	86	0	173	195	160
Other	1	2	7	180	190	0	193	1	0	9
No information	2	2	3	0	6	0	4	2	1	1
Total	110	193	212	197	197	199	199	190	199	218

APPENDIX IV.1

TABLE XXIII

Number of Houses with Latrin,
Raw Counts, for Beni Suef and
Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Latrine	11	12	13	14	15	16	17	18	19	20
Present	22	54	51	35	119	196	154	151	147	196
Not Present	69	112	159	160	12	3	23	37	16	19
No information	19	27	2	2	66	0	22	2	36	3
Total	110	193	212	197	197	199	199	190	199	218

IV.1

TABLE XXIV

Number of Houses Using Latrine,
Raw Counts, for Beni Suef and
Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Latrine Use	11	12	13	14	15	16	17	18	19	20
Yes	24	52	49	33	119	195	153	149	122	199
No	31	100	159	54	7	4	13	38	52	16
No information	55	41	4	110	71	0	33	3	25	3
Total	110	193	212	197	197	199	199	190	199	218

APPENDIX IV.1

TABLE XXV

Number of Houses with Covered Latrine,
Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Latrine Cover	11	12	13	14	15	16	17	18	19	20
Yes	7	49	48	10	117	157	145	150	4	193
No	38	100	159	61	6	41	20	37	162	19
No information	65	44	5	126	74	1	34	3	33	6
Total	110	193	212	197	197	199	199	190	199	218

IV.1

TABLE XXVI

Latrine Type by Number of Houses, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Latrine Type	11	12	13	14	15	16	17	18	19	20
Borehole	2	0	0	4	1	3	1	19	10	13
Pit	17	54	38	6	114	144	93	116	60	157
Masonry Walls	2	3	15	24	1	34	39	17	76	34
Pit and Masonry Walls	0	0	0	0	0	0	9	0	0	1
No information	89	136	159	163	81	18	57	38	53	13
Total	110	193	212	197	197	199	199	190	199	218

APPENDIX IV.1

TABLE XXVII

Presence of Water Carriage in Latrine by Number of Houses, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Water Carriage in Latrine	11	12	13	14	15	16	17	18	19	20
Yes	0	1	1	0	0	0	0	1	1	0
No	52	155	56	79	118	194	158	179	174	217
No information	58	37	155	118	79	5	41	10	23	1
Total	110	193	212	197	197	199	199	190	199	218

IV.1

TABLE XXVIII

Number of Houses with Septic Tank, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Septic Tank	11	12	13	14	15	16	17	18	19	20
Yes	0	6	6	0	0	2	0	1	1	0
No	52	149	51	78	118	192	158	183	177	217
No information	58	38	155	119	79	5	41	6	21	1
Total	110	193	212	197	197	199	199	190	199	218

APPENDIX IV.1 TABLE XXIX

Number of Houses with Cesspool, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Cesspool	11	12	13	14	15	16	17	18	19	20
Yes	0	21	4	6	1	32	13	135	13	2
No	52	136	54	70	116	162	143	49	163	216
No information	58	36	154	121	80	5	43	6	23	0
Total	110	193	212	197	197	199	199	190	199	218

IV.1 TABLE XXX

Latrine Location by Number of Houses, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Latrine Location	11	12	13	14	15	16	17	18	19	20
Inside	16	42	50	32	116	188	142	150	143	5
Outside	2	2	4	3	2	1	9	1	12	206
Stable	0	0	0	0	0	2	0	0	0	0
No information	92	149	158	162	79	8	48	39	44	7
Total	110	193	212	197	197	199	199	190	199	218

APPENDIX IV.1 TABLE XXXI

Number of Houses with Latrine Superstructure, Raw Counts, for Beni Suef and Kafr El Sheikh

	Study site code									
	Beni Suef					Kafr El Sheikh				
Latrine Super-Structure	11	12	13	14	15	16	17	18	19	20
Yes	2	5	1	22	0	4	1	3	4	0
No	18	146	50	54	117	190	154	179	174	218
No information	90	42	161	121	80	5	44	8	21	0
Total	110	193	212	197	197	199	199	190	199	218

APPENDIX IV.2 TABLE I

Number of Houses by Construction Material, Raw Counts, for Aswan and New Nubia

Construction Material	Study site code Aswan 1	2	3	4	10	New Nubia 5	6	7	8	9
Stone or Redbrick	20	19	77	0	5	187	192	190	200	198
Mud Brick	150	27	2	185	181	9	7	7	0	1
Wood or Reed	1	0	0	0	3	0	0	0	0	0
Mud and Red Brick	17	178	40	2	0	0	1	2	0	0
Red Brick, Wood or Reed	0	0	2	0	0	0	0	1	0	0
Red Brick, Mud Brick, Wood or Reed	1	0	1	0	0	0	0	0	0	0
Mud Brick, Wood or Reed	0	0	1	0	0	0	0	0	0	0
No information	3	0	0	23	2	2	2	0	1	1
Total	192	224	123	210	191	198	202	200	201	200

TABLE II

Number of Houses by Structure Attachment, Raw Counts, for Aswan and New Nubia

Structure Attachment	Study site code Aswan 1	2	3	4	10	New Nubia 5	6	7	8	9
Detached	15	12	5	18	6	2	1	7	2	0
One Side only	73	55	16	72	27	8	2	10	14	3
Two Sides	69	89	42	80	105	62	28	52	62	49
Three Sides	10	68	60	12	53	123	168	131	122	146
No Information	25	0	0	28	0	3	3	0	1	2
Total	192	224	123	210	191	198	202	200	201	200

APPENDIX IV.2

TABLE III

Number of Houses with Painted Walls, Raw Counts, for Aswan and New Nubia

Painted Walls	Study site code Aswan 1	2	3	4	10	New Nubia 5	6	7	8	9
Exterior	11	5	32	30	13	68	2	1	4	3
Interior	11	14	64	55	30	30	39	2	15	145
None	27	52	4	99	148	98	158	7	173	1
Exterior and Interior	136	151	23	0	0	0	0	185	7	50
No information	7	2	0	26	0	2	3	5	2	1
Total	192	224	123	210	191	198	202	200	201	200

TABLE IV

Number of Houses with Staircase, Raw Counts, for Aswan and New Nubia

Staircase	Study site code Aswan 1	2	3	4	10	New Nubia 5	6	7	8	9
Fixed	27	13	14	0	14	3	0	2	2	0
Mobile	4	6	2	2	68	0	1	1	0	11
None	141	203	106	178	109	194	197	193	198	187
No information	20	0	1	30	0	1	4	4	1	2
Total	192	224	123	210	191	198	202	200	201	200

TABLE V

Number of Houses by Type of Roof Material, Raw Counts, for Aswan and New Nubia

Roof Material	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Reed and Mud	2	13	37	1	0	0	0	3	0	0
Wood, Reed and Mud	0	0	30	0	0	0	0	2	0	0
Concrete	15	7	1	2	2	188	190	173	191	192
Wood	4	9	1	8	2	5	1	1	3	2
Reed	2	14	3	5	183	3	3	0	2	0
Mud	128	164	50	171	4	1	4	0	0	0
Concrete and Wood	1	1	0	0	0	0	1	8	0	1
Concrete and Mud	2	1	0	0	0	0	0	1	0	0
Concrete, Wood, and Reed	0	0	0	0	0	0	0	3	0	0
Wood and Reed	0	5	0	0	0	0	0	2	0	0
No information	38	10	1	23	0	1	3	7	5	5
Total	192	224	123	210	191	198	202	200	201	200

TABLE VI

Number of Houses by Condition of Roof, Raw Counts, for Aswan and New Nubia

Roof Condition	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Permeable	33	91	89	180	174	12	3	10	58	5
Non-permeable	55	132	32	6	15	185	192	184	4	192
No information	104	1	2	24	2	1	7	6	139	3
Total	192	224	123	210	191	198	202	200	201	200

APPENDIX IV.2

TABLE VII

Number of Houses by Storage location of Cooking and Heating Fuel, Raw Counts, for Aswan and New Nubia

Storage of Fuel Material	Study site code Aswan 1	2	3	4	10	New Nubia 5	6	7	8	9
Roof	7	24	9	99	16	137	129	5	4	68
Stable	6	23	19	53	53	4	36	1	59	3
Storage Room	3	7	76	30	63	16	1	2	0	0
Yard	115	168	19	4	57	39	27	192	133	125
Roof and Storage Room	0	1	0	0	0	0	1	0	0	0
No information	61	1	0	24	2	2	8	0	5	4
Total	192	224	123	210	191	198	202	200	201	200

TABLE VIII

Number of Houses by Type of Floor Construction, Raw Counts, for Aswan and New Nubia

Floor Construction	Study site code Aswan 1	2	3	4	10	New Nubia 5	6	7	8	9
Earth	108	60	112	176	182	82	9	9	0	1
Concrete	42	2	0	4	7	111	11	1	80	184
Tile	14	12	0	0	2	1	0	1	0	11
Wood	0	1	0	2	0	0	0	0	0	0
Earth and Concrete	6	56	0	0	0	0	171	175	115	0
Earth and Tile	2	42	0	1	0	0	3	0	0	0
Earth and Wood	0	0	10	0	0	0	2	3	4	0
Earth, Concrete, Tile	0	45	0	0	0	0	4	10	0	0
No Information	20	6	1	27	0	4	2	1	2	4
Total	192	224	123	210	191	198	202	200	201	200

APPENDIX IV.2

TABLE IX

Number of Houses by Number of Windows,
Raw Counts, for Aswan and New Nubia

	Study site code									
Number of Windows	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
1	16	22	0	20	55	15	11	25	7	0
2	16	36	15	21	56	43	26	58	73	68
3	20	29	3	7	26	52	66	37	24	126
4	17	25	33	7	24	32	36	38	24	3
5	8	16	18	1	1	12	3	7	3	0
6	4	21	29	3	2	19	17	17	15	0
7	1	3	1	0	1	12	31	11	25	0
8	1	9	9	0	2	6	2	4	22	0
9	3	0	0	0	0	1	1	0	4	0
10 or more	4	5	1	1	2	3	0	1	4	0
No information	102	58	14	150	22	3	9	2	0	3
Total	192	224	123	210	191	198	202	200	201	200

TABLE X

Number of Houses by Type of Lighting,
Raw Counts, for Aswan and New Nubia

	Study site code									
	Aswan					New Nubia				
Lighting	1	2	3	4	10	5	6	7	8	9
Electricity	90	179	55	85	27	77	79	21	108	113
Kerosene	90	44	52	99	164	118	120	131	93	83
Other	0	1	0	1	0	0	0	3	0	1
Electricity and Kerosene	0	0	9	0	0	0	0	43	0	0
Kerosene and Other	0	0	7	0	0	0	0	1	0	0
No information	12	0	0	25	0	3	3	1	0	3
Total	192	224	123	210	191	198	202	200	201	200

APPENDIX IV.2

TABLE XI

Number of Houses with Televisions, Raw Counts, for Aswan and New Nubia

	Study site code									
	Aswan					New Nubia				
Television	1	2	3	4	10	5	6	7	8	9
Present	9	36	1	6	5	6	3	2	40	12
Not Present	154	185	121	159	186	189	186	178	159	182
No information	29	3	1	45	0	3	13	20	2	6
Total	192	224	123	210	191	198	202	200	201	200

TABLE XII

Number of Houses by Number of Rooms in House, Raw Counts, for Aswan and New Nubia

	Study site code									
	Aswan					New Nubia				
Number of Rooms	1	2	3	4	10	5	6	7	8	9
1	17	11	0	0	48	14	11	26	4	0
2	62	43	6	13	57	44	26	60	77	67
3	53	42	4	21	41	53	92	37	28	127
4	20	39	18	53	22	64	65	61	52	3
5	11	29	16	45	7	18	3	14	34	0
6	8	25	36	20	3	1	0	0	2	0
7	3	14	9	20	3	1	0	1	2	0
8 or more	7	19	34	15	10	2	0	1	2	1
No information	11	2	0	23	0	1	5	0	0	2

APPENDIX IV.2 TABLE XIII

Number of Houses by Number of Occupants, Raw Counts, for Aswan and New Nubia

	Study site code									
	Aswan					New Nubia				
Number of Occupants	1	2	3	4	10	5	6	7	8	9
1	8	9	3	29	23	16	16	24	87	33
2	16	11	4	28	26	15	27	30	52	41
3	24	15	8	29	34	23	19	30	23	18
4	32	32	9	36	22	26	30	22	15	26
5	39	46	13	27	19	33	32	25	12	20
6	19	19	16	19	15	29	22	21	5	15
7	18	20	10	11	13	18	16	19	2	13
8	8	30	11	5	12	13	19	8	1	8
9	2	17	8	2	8	8	8	6	2	11
10 or more	4	24	33	1	17	11	10	9	2	12
No information	22	1	8	23	2	6	3	6	0	3
Total	192	224	123	210	191	198	202	200	201	200

TABLE XIV

Number of Houses by presence of Stable, Raw Counts, for Aswan and New Nubia

	Study site code									
	Aswan					New Nubia				
Stable	1	2	3	4	10	5	6	7	8	9
Inside	114	178	81	149	64	183	146	191	185	197
Outside	20	6	27	21	52	2	21	3	4	0
None	40	34	14	15	73	9	6	5	12	2
No information	18	6	1	25	2	4	29	1	0	1
Total	192	224	123	210	191	198	202	200	201	200

APPENDIX IV.2

TABLE XV

Number of Houses by Presence of Waste Container in House, Raw Counts, for Aswan and New Nubia

Waste Container	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Present	9	199	3	72	49	7	184	161	0	34
None	79	25	120	112	140	182	13	37	199	165
No information	104	0	0	26	2	9	5	2	2	1
Total	192	224	123	210	191	198	202	200	201	200

TABLE XVI

Number of Houses by Location of Animal Waste Disposal, Raw Counts, for Aswan and New Nubia

Animal Waste Material	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Stable	4	56	25	14	16	3	5	5	1	9
Yard	9	7	27	6	67	3	0	1	0	2
Street	94	33	66	169	23	187	0	189	20	0
Canal	0	0	0	0	0	0	0	0	176	1
Roof	0	0	0	0	1	0	0	1	0	7
None	29	127	5	0	82	0	193	3	3	178
No information	56	1	0	21	2	5	4	1	1	3
Total	192	224	123	210	191	198	202	200	201	200

APPENDIX IV.2 TABLE XVII

Number of Houses by Type of cook fuel employed, Raw Counts, for Aswan and New Nubia

	Study site code									
Cooking Fuel	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Wood and Dung	1	1	26	0	0	0	0	0	0	0
Oil, Wood, and Dung	0	0	30	1	0	0	0	5	0	0
Gas	3	16	0	0	0	4	1	0	111	11
Oil	142	39	19	153	145	184	2	37	10	188
Wood	4	2	4	27	42	5	0	1	0	0
Dung	4	0	0	7	0	0	0	0	7	0
Gas and Oil	1	2	0	0	0	0	2	3	4	0
Gas and Wood	1	5	1	0	1	0	1	1	0	0
Gas and Dung	0	54	3	0	0	0	10	0	57	0
Gas, Oil,Wood	5	3	20	0	0	1	1	151	0	0
No Information	31	102	20	22	3	4	185	2	0	1
Total	192	224	123	210	191	198	202	200	201	200

TABLE XVIII

Number of Houses by Frequency of Stable Cleaning, Raw Counts, for Aswan and New Nubia

	Study site code									
Stable Cleaning	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Daily	108	167	8	56	2	189	6	192	196	193
Weekly	36	27	68	69	100	2	7	2	2	5
Monthly	2	0	35	61	20	0	168	2	0	0
Never	3	1	1	1	12	0	14	0	0	0
No information	43	29	11	23	57	7	7	4	3	2
Total	192	224	123	210	191	198	202	200	201	200

APPENDIX IV.2

TABLE XIX

Number of Houses by Type of Approach to Houses, Raw Counts, for Aswan and New Nubia

House Approach	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Non-Earth:										
Clean	11	218	1	48	90	187	1	0	200	2
Littered	4	0	0	42	33	3	3	0	0	0
Dry	170	0	10	98	64	2	0	0	0	0
Wet	0	0	0	1	1	0	0	0	0	0
Earth:										
Clean	1	1	0	0	0	0	1	0	0	1
Littered	0	1	0	0	0	0	93	99	0	0
Dry	0	0	0	0	0	0	1	0	0	0
Wet	0	0	0	0	0	0	1	0	0	0
No information	6	4	112	21	3	6	102	101	1	197
Total	192	224	123	210	191	198	202	200	201	200

TABLE XX

Number of Houses by Ownership, Raw Counts, for Aswan and New Nubia

Ownership	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Own	77	27	7	8	9	31	1	1	0	3
Rent	113	196	106	181	177	95	16	8	200	136
No information	2	1	10	21	5	72	185	191	1	61
Total	192	224	123	210	191	198	202	200	201	200

APPENDIX IV.2

TABLE XXI

Number of Houses by Type of Water Storage Container, Raw Counts, For Aswan and New Nubia

Water Storage	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Metal	0	2	1	10	0	0	0	0	1	3
Earthenware	20	149	120	170	190	192	196	196	192	195
Ceramic	0	45	0	6	0	0	0	0	2	0
Other	1	0	0	0	0	0	0	0	0	0
Metal and Ceramic	0	11	1	0	0	0	0	4	0	0
Metal and Earthenware	0	3	0	0	0	0	0	0	1	0
Ceramic and Earthenware	0	12	0	0	0	0	0	0	0	0
No information	1	1	1	24	1	7	3	0	4	2
Total	22	223	122	210	191	199	199	200	200	200

TABLE XXII

Number of Houses by Type of Wastewater Drainage, Raw Counts, for Aswan and New Nubia

Wastewater Drainage	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Concrete	1	6	0	2	0	110	8	24	4	5
Pipe	0	0	2	1	0	0	0	1	1	1
Brick	0	0	1	2	0	0	0	0	0	0
Title	0	0	1	1	0	72	0	1	0	4
Earth	0	209	84	176	190	9	188	173	0	1
Other	6	2	30	3	0	0	0	0	189	186
No information	15	6	5	25	0	8	3	1	6	3
Total	22	223	123	210	190	199	199	200	200	200

APPENDIX IV.2

TABLE XXIII

Number of Houses by Presence of Latrine, Raw Counts, for Aswan and New Nubia

	Study site code									
	Aswan					New Nubia				
Latrine	1	2	3	4	10	5	6	7	8	9
Present	5	201	15	48	96	186	192	196	195	199
Not Present	2	7	89	73	94	4	4	3	1	0
No information	15	15	19	89	0	9	3	1	4	1
Total	22	223	123	210	190	199	199	200	200	200

TABLE XXIV

Number of Houses by Latrine Use, Raw Counts, for Aswan and New Nubia

	Study site code									
	Aswan					New Nubia				
Latrine Use	1	2	3	4	10	5	6	7	8	9
Yes	2	200	15	49	95	187	191	196	187	199
No	1	5	106	68	95	3	5	2	9	0
No information	19	18	2	93	0	9	3	2	4	1
Total	22	223	123	210	190	199	199	200	200	200

APPENDIX IV.2

TABLE XXV

Number of Houses by Presence of a Cover for the Latrine, Raw Counts, for Aswan and New Nubia

	Study site code									
	Aswan					New Nubia				
Latrine Cover	1	2	3	4	10	5	6	7	8	9
Present	0	196	15	43	95	115	192	194	24	199
Not Present	1	7	106	69	95	76	4	4	168	0
No information	21	20	2	98	0	8	3	2	8	1
Total	22	223	123	210	190	199	199	200	200	200

TABLE XXVI

Number of Houses by Type of Latrine, Raw Counts, for Aswan and New Nubia

Type of Latrine	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Bore hole	0	11	0	4	1	4	0	1	3	2
Pit	1	168	7	46	0	7	5	1	174	197
Pit with Masonry Lining	0	21	9	1	94	176	187	191	1	0
No information	21	23	107	159	95	12	7	7	22	1
Total	22	223	123	210	190	199	199	200	200	200

TABLE XXVII

Number of Houses by Location of Latrine, Raw Counts, for Aswan and New Nubia

Latrine Location	Study site code									
	Aswan					New Nubia				
	1	2	3	4	10	5	6	7	8	9
Inside	3	177	7	19	17	191	190	191	196	198
Outside	0	23	2	22	1	0	1	3	4	0
Stable	0	1	0	0	65	0	1	0	0	0
No information	19	22	114	169	107	8	7	6	0	2
Total	22	223	123	210	190	199	199	200	200	200